PERSONAL

EVERY THURSDAY

COMPUTER NEWS

THE COMPLETE COMPUTING WEEKLY

JULY 21-JULY 27

Vol 1 No 20

45p

THIS WEEK

MICRO MUSIC
Tune-up tips for Vic, Atari, BBC & Apple in Sound Micropaedia, part 4.

PET PAYROLL
Bonus adds sick pay to wage calculations



DIY BARE BOARD
The naked truth about Rade's DIY Computer

COMMODORE STORAGE
Tape v disk: does Currah's tape drive too hard a bargain?

EVERY WEEK

PCN DATABASICS
Your guide to software in this detailed buyer's list

PCN GAMEPLAY
We give our verdict on new games

Exclusive Pro-Test

Cut-price colour with Seikosha's GP700A



MENU

July 21-July 27, 1983 Volume 1 No 20

Action and reaction

PCN thanks you all for understanding why we went up to 45p.

As some of you pointed out, it is a fairly large percentage increase and, to make matters worse, we failed to tell you it was about to happen, or why it was necessary.

But, despite this, your reaction has been amazing. Now we will do our bit. That extra 10p will enable us to continue to provide 100 colourful pages every week.

We won't have to cut costs and reduce quality. In fact, we plan to do even better. More news, more exclusives, more programs . . . more value for more money.

But let us know if *PCN* is not giving you what you want. There's a whole team here trying to meet your demands, but we need your input.

And, thanks again . . .

PULL-OUT

Micropaedia Sound: Part 4

Sound, music and music on your micro.

REGULARS

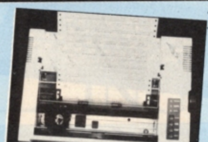
Cover photo by Ian McKinnell

PCN SPECIALS



PCN PRO-TEST: SOFTWARE

PCN PRO-TEST: PERIPHERALS





PCN PRO-TEST: HARDWARE



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Electron mis-match

By Geoff Wheelwright

Although it's being touted as a 'poor man's BBC', Acorn's soon-to-be-released Electron micro will not run all the Beeb's software.

The Electron will be unable to handle BBC micro programs that rely on a Tube interface, a printer interface, a 6522 Versatile Interface Adaptor, a User Port or the Teletext graphics mode. Although all BBC programs should LOAD on the Electron, they may have too be modified in order to RUN.

To get round this seemingly embarrassing problem, Acorn's software house — Acornsoft — is adapting 12 BBC programs for the Electron and plans to have them ready for distribution in time for the Electron's launch (anticipated for August 23). An Acorn spokesman suggested that in future Acorn will release more cassette software with the BBC version on one side of the cassette and the Electron version on the other.

But the compatibility problem doesn't extend to simple Basic programs, since most such programs written on the BBC will RUN and LOAD on the Electron — albeit at a slower speed due to the nature of the Electron's memory arrangement.

Ironically, perhaps the most complex BBC programs — chip software like Acornsoft's View word processor—could run with no modifications on the Electron as long as you replace the Electron's Basic chip with the appropriate sideways ROM program.

Acorn does plan to release expansion modules to give the Electron all the facilities of the BBC, but there is no word yet as to when those expansion modules will be ready. And Acorn has promised it will cost more to buy all the expansion modules necessary to make an Electron full BBC-compatible than it would to buy a BBC.

Acorn says Electron software should be more upwardly compatible with the BBC than the other way round — but given that there are no Electron programs commercially available yet, there isn't likely to be much immediate demand for 'downward compatibility'.

So it looks as though the Electron's success will be determined solely by its own strengths.

Stolen Spectrums recovered

By Ralph Bancroft

Prism Microproducts has been reunited with its stolen Spectrums and nine people appeared in court last week charged with stealing or handling them as stolen property.

As a result availability of Spectrums in Prism's outlets should soon be back to normal.

The arrests and recovery of the machines follows countrywide investigations by the Serious Crimes Squad of Scotland Yard and a number of 'midnight swoops'.

By all accounts the robbery was a well organised affair which included distributing the estimated 3,000 machines around the country.

Police were able to trace the stolen Spectrums when several shops usually supplied by Prism were offered between 10 and 20 Spectrums from bankrupt stock.

Prism is now trying to catch up with its backlog of deliveries to dealers. 'Sinclair have been very helpful,' said a Prism spokesman. 'We took a delivery from them last week that was larger than scheduled.

'Most shops should now have Spectrums in stock. Those that sell out will have to wait seven days for additional supplies,' he added.



PEN PORTRAIT-For BBC, Dragon and ic users who like dabbling on the screen, here's a new style of light pen. Datapen comes with a range of software at £25. It has an LED readout and a positioning switch. In addition to user routines and example programs, the company (also called Datapen) is providing a freehand drawing program. It is currently awaiting a technical drawing program that allow symbols to be created in a library and then combined on the screen. Contact Datapen on Overton (0256) 770488.



MATTEL MATERIALISES — The long-awaited under £100 Aquarius micro from Mattel will finally be officially launched on Wednesday, July 27, some three months after it was Pro-tested in *PCN issue 7*.

64 utilities cross the pond

A flood of business and utility packages for the Commodore 64 has swept across North America.

Script 64 is a word processing program selling at £65. Two dictionary creation and maintenance programs enable you to create your own spelling checker and it has all the usual features of a standard word processing package.

Another word processor available is the Totl.Text at £34, for both tape and disk systems. It has machine code speed for loading and printing, but employs Basic for program accessibility and modification.

C64-Link, which costs £100, allows you to use popular printers and peripherals once the correct leads have been fitted. The cartridge port attachment also allows the Basic to be upgraded from V2 to Basic V4.

And there's built-in modem software which allows the C64 to talk to other computer equipped with the same modem.

For a change of tongue you can also pick up C64-Forth for £70. This version has Fig-Forth and Forth-79 compatibility and occupies 16K of memory to leave 41K of RAM free.

Contact The Six-Four Supplies Company, PO Box 19, Whitstable, Kent CT5 1TJ.

BBC English

By David Guest

A school project that set out to help pupils with reading problems could give you a speech synthesis unit for your BBC for about £30.

The unit was designed by Mike Lee of Lostock School in Manchester. 'We built it for the remedial department,' says Mr Lee. 'Some of the students have great difficulty in reading and we felt a speech unit may be a useful alternative approach.'

But the unit has aroused interest outside the school, and is now going into production as a general purpose device. The features built in for its original use make it look very versatile and the economies imposed by the education system have kept its price down.

According to Mr Lee it uses two standard circuits, a speech circuit and a voltage-controlled oscillator, and its phonetic base gives it a virtually infinite vocabulary. Its intonation can be varied, with a choice of high/medium/low pitch.

Its output goes through the micro, but you can hook it up to an external amp. It is self-contained, about the size of a cassette case, and has automatic reset on connection to the system.

Specialised software that already exists for the device includes reading trainers that use pictures and spelling prompts. You type in syllables, words or sentences and the unit intones them. 'You can string as long a sentence together as you want,' says Mr Lee.

The unit is being assembled locally at the Government-sponsored Salford Information Technology Centre, and current output is about 20 a month, although Mr Lee says that plans to expand this are under way.

The speech synthesis unit will cost between £29 and £35, depending on the specification you need.

For further information contact Mr Lee on 061-962 7315.

CBM purges prices

Commodore has taken a scythe to the prices of its Commodore 64, cartridge games, and add-ons for the Vic 20 and the 64.

From August 1 the recommended retail price of the 64 will be £229, down form £345. All cartridge games for the Vic 20 and the 64 will cost £9.99.

But you won't have to wait a month for these new prices, because Commodore has been pre-empted by its dealers in the same way that Sinclair was beaten to its price cuts two months ago. Some dealers have jumped the gun, and last week Commodore 64s were on sale in Lasky's and Dixons for around £225.

The new price of the 64 (predicted in *PCN*, issue 14) will set the cat among the pigeons across the entire £150 to £400 range. The change in the cost of cartridges could eventually prove to be more important. It is the first stage of Commodore's attempt to muscle in on the software business (*PCN*, issue 19). It mirrors a price cut that the company made in the US at the Consumer Electronics Show.

It will also steal some of Sinclair's thunder — the UK manufacturer has announced it will release cartridge software at around £10 later this year.

But a Sinclair spokesman took the news calmly: 'Commodore's move in slashing the price of cartridge software will have no effect on our plans whatoever.'

Also reduced in Commodore's lists are the prices of expansion packs for the Vic 20 and the single disk drive for this system and the 64.

All the expansion packs for the Vic 20 will be much cheaper from August 1. The 3K unit comes down from £29.95 to £19.95, the 8K from £44.95 to £29.95, and the 16K by almost 50 per cent from £74.95 to £39.95.

The single disk drive was £299.95 and is now £229.



Commodore 64 down to £229 — can its competitors respond?

Clone throws down gauntlet

By Ralph Bancroft

If you attempt to copy a disk containing commercial software you could break the copyright laws. But if you own a BBC micro and can cope with the legal consequences you can buy a product called the Clone Ranger which allows you to do just this.

A spokesman from the manufacturer, JC Software, says the software was produced so you can make back-up copies of 'virtually all protected disks'.

Treading carefully, Richard Chiswell, who runs the company, says: 'Obviously the subject of software piracy is a delicate one and it is not intended that Clone Ranger be used for such purposes.'

The instructions with the software are more forthright. Clone Ranger 'should not be used for any form of software piracy and to do so would constitute an offence under the Copyright Act,' it says.

No doubt, even this will be ignored by some. So software companies will invent new ways to protect their software making Clone Ranger ineffectual.

They would be doing everyone a favour (including themselves) if they faced facts and produced software that can be backed-up.

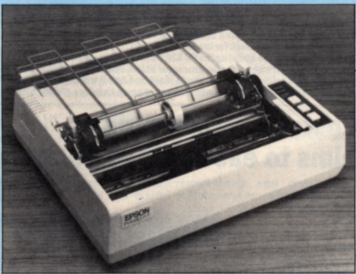
In the meantime, BBC users may like to know that Clone Ranger costs £11.60 (including postage) from JC Software, 124 Woodlands Way, Southwater, West Sussex.

Dragon disks on schedule

The long-awaited disk drives from Dragon Data will be in the shops by the end of this month.

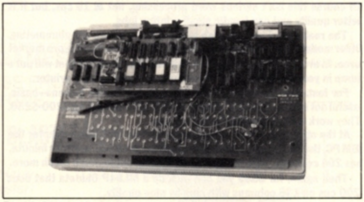
Their price of £275 includes the controller and cables.

The 5¼in drive is single sided, double density, with 40 tracks, 18 sectors with 256 bytes per sector. The drives will be available from Boots and Dixons.



ON THE UPGRADE — Epson has upgraded the RX-80 dot matrix printer with a friction feed version. The new variation has been dubbed the RX-80 F/T and Epson sees it filling some users' needs for single sheet printing. With the friction feed option you are no longer limited to continuous stationary. Instead you can feed in your letterhead paper for the generation of standard letters and presentation documents. The RX-80 F/T is priced at £350 and has all the features of its standard stablemate, the RX-80 as featured in *PCN* issue 8.

Atomic pile



Bargain Atoms — but you may need help if they go wrong

By Sandra Grandison

Acorn dealers have been busily slashing prices of the old Acorn Atom to make room for the newcomer — the Electron.

Although you may be able to pick up a cheap Atom it's not always guaranteed that you'll get the dealer support you may need. On this point an Acorn spokesman said: 'If a user wants to take advantage of a low price then he has to go along with whatever deal the dealer is offering.

'He has to work out for himself whether or not it's worthwhile. In any case, he could go to another dealer and pay the extra to get the support he needs for his machine.'

Acorn stopped producing Atoms some time ago, and if you shop around you could pick up a 12K model for as little as £50 from a company called Computer Plus in Watford. 'It's a stock clearance,' said a spokesman from the firm. And buyers had better be quick as they only have four left.

REW in London, another Acorn dealer, is also phasing out Atoms and has reduced the price from £165 to £149 for the 8K machine. David Weir, computer manager said: 'If people want Atoms we'll get them.

'Most of the demand has been for the BBC and when the Electron comes out we'll be selling it.'

A spokesman from Technomatics head office in London, felt that the Atom was out-of-date and said: 'There are better machines on the market, and when our stocks run out we shan't be getting any more.'

From one of its stores in Edgware Road, London, you could buy an 8K Atom at £79.95 plus VAT and every machine comes with dealer support.

VIEW FROM AMERICA



Of printer prices and the domino theory

By Chris Rowley

Here, the ads trumpet, help yourself to our home computer, you'll be doing us a favour, just take it away.

No — take this one, it's much much cheaper.

Buy ours, they shriek, and we'll throw in a 13in colour TV for just $75. Heck, over here on this model it says manufacturers rebate for 100% total cost, all you buy is the software.

On TV, in print advertising, at shows and conventions, marketing madness is in the air on the US home computer scene. Pressure is mounting. A jittery Wall Street has observed too many small computers chasing too few dollars. Dollars can only go up in that context – bad news for big companies that sank big dollars into little machines in the recent past.

The markets, however, did note the winners of the summer of '83. IBM looks better than ever, Apple reports strong sales, Commodore stock grows 128% in line with the 130% sale increase reported on the first quarter of the year. And at Chicago Coleco wowed 'em at the CES with the Adam and the promise of affordable printing on the home computer market.

The pundits agree, proverbially perhaps, that if a woman without a man is a fish without a bicycle then a computer without a printer is a bike with one leg. Really, having a printer is essential to avoid that back of the closet syndrome once everyone's worn out from squelching Donkey Frogs.

In this scenario the $600 Coleco Adam with its 80K RAM, Z80, tape drive and ROM word processor, plus a 10 cps daisywheel printer, may wind up being as revolutionary a machine as the Apple II or the Sinclair. Of course this isn't serious word processing, not at 10 cps, but it is letter quality and can handle small printing jobs.

The really good news though is that printer prices are plummeting. Older models have become sale add-ons in the Osborne/Kaypro market area. In every market sector there are new machines out that will put a lump in your throat if you've ever contemplated buying a printer.

For instance the Seikosha GP100 and the Gorilla Banana–basic, useful dot matrix machines that do 30-50 cps, are costing $200-$250. They work with all the Z80 based micros.

At the other end of the scale you can get the NEC Spinwriter for the IBM PC, the 3550, for $1,815. This machine does 350 word per minute, has 204 columns, auto-proportional spacing amdn much much more.

Then again, for $999 you can pick up a ML84P Okidata that does 200 cps on 136 columns with nine by nine quality.

In the mid-range, now down to $400 or so are the Epson MX80, C Itoh Prowriter and other excellent dot matrix machines. For another $100 there are the daisywheels like the Smith Corona TP/1.

For Timex Sinclair users there's the TS2040, 64 cps thermal, which runs 4.3in paper and costs just $100. Or for $129 from MidWare there's the MW 100, a 5×7 quality dot matrix that prints on 1¾in tape at 16 cps. In addition, Alphacom recently closed an OEM deal worth $54m with Timex to supple new printers for the TS line.

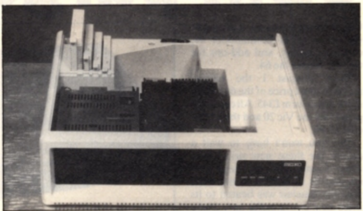
Locked in step with printers, print buffer prices have fallen drastically too. Board buffers can be had for $60 and up, stand alone buffers are down to $250 and up. Serious word processing is now in the reach of the home user. For $1,500 to $2,000 any business, researcher, writer or editor can take on the agony of WordStar and save time on the typewriter.

If those good ol' pundits are right and printer sales soar and prices fall there will of course be general joy and jubilation.

Freelance typing however, will become a quaint industrial practice of the past. Anyone contemplating a career as a typist should take note.

They may be better advised to train to become printer engineers. Low prices are seductive and print speeds of less than 20 CPS have a reliable, pedestrian, sort of sound but nobody knows yet how long these printers will run in the rough and tumble of the PC user's living room before they fail.

Seiko in time



Seiko/Marubeni's 8600 — a business micro with few frills.

A business-like micro from Seiko made it to the UK last week as the distributor, Intelligence UK, launched the Seiko 8600.

The machine, based on the 8086 processor, as may be guessed from the name, is immaculately designed. The removable parts, such as RAM expansion cards, are encased in plastic and easily removed (even with the power on), as are the disk-drives, which can be removed for field-servicing without any tools.

Up to three additional terminals may be attached, producing a cluster which Intelligence feels is the optimum size for the business users it's aiming at.

The machine is devoid of such frills as high-resolution colour graphics, since the company wished to produce a machine which would not confuse first time computer users.

It intends that the machine should gain a reputation for high-reliability.

A dealer network, split into two levels and initially having about twenty members, will be formed.

A configuration for four users with 256K of RAM, a 10Mb Winchester hard disk, and 640K on floppies at the central station, will cost about £7,000.

Intelligence UK is in London on 01-543 3711.



CLOCK SLOT — Not the kind of digital chronometer that put the Swiss out of business, but a 4MHz clock for the Sharp PC 3201. It comes from Market Logic, which says that it can speed up the PC 3201's processing speed by more than 50 per cent. It fits straight on to the processor board, sparing you any trouble with wire cutters of solder, and according to Machine Logic it works with any type of diskette. It costs about £30. Further information on Uxbridge (0895) 52131.

Lostock screen utility aims to ease editing chore

Apple users who spend hours typing in programs can now ease the task with the Lostock Screen Editor.

Lostock uses a second screen cursor which is moved around the screen either with control keys or Escape mode keys — while the normal cursor remains and generates the new input line on the screen. This means that it's easy to see what's being entered in the editing process.

In addition, whole screen lines can be copied at a single keystroke, and another control code makes the editor skip the spaces inserted into strings and REM's by List commands.

Unlike line editors, the Lostock Screen Editor is claimed to do all that the Apple's own screen editing facility will do. And an optional feature is Auto line numbering.

The package comes as a standard Applesoft program at £14.90 or £18.35 with Auto line numbering facility. And a secret identifier, unique to each copy supplied, is used to discourage piracy.

Contact Lostock Software, 0204 67715.

GEC carries Torch

Just one week after launching its new machines and software Torch has sold out to billion pound conglomerate GEC. It can only be good news for Torch owners.

GEC is Britain's biggest electronics group and is awash with cash for new investments — to the tune of £1.3 billion. It paid in the region of £3 million (0.2 per cent of that total) to buy 76 per cent of Torch's shares from existing shareholders.

But this is just the start of the money that GEC will be putting into the company.

According to Martin Vlieland-Boddy, Torch's chairman, GEC is giving 100 per cent backing to Torch. This will include financial backing for product development, additional manufacturing facilities, marketing and after-sales support.

The move will also strengthen the confidence in Torch of potential customers at a time when some press reports were suggesting that the company was in financial trouble.

'The end user normally goes for a stable company and the credibility of having a major company like GEC behind us will allow us to take on IBM and Sirus,' said Mr Vlieland-Boddy.

The GEC connection will give Torch access to GEC's widespread interests including manufacturing facilities, world-wide sales and marketing operation and the eight UK service depots run by GEC Reliance.

'We currently operate a 28 day delivery and we have no intention of falling behind that. If we find that demand for our products exceeds supply we can go back to GEC for extra manufacturing facilities'.

The other gain for users is the security of buying a computer from a large multinational company. 'If something goes wrong with your Torch in twenty years time there will still be somebody around who can provide you with the spare parts,' he said.

From GEC's point of view it is now able to offer its customers a complete range of computers as the top end Torch — the 16-bit 700 series — ends where GEC's minicomputers start.

It is perhaps a coincidence that GEC makes the computers used to run Prestel, and Torch makes a micro that comes complete with integral modem and Prestel software as standard features, but it could make the union productive.

TV looks for micro families

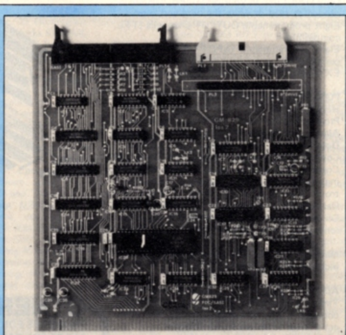
Thames TV is to run a new series of its successful Database programme in September and is asking home users to assist.

One of the programmes in the series will be looking at families making use of micros. 'We want to cover everything you can do from home,' said the programme's producer Michael Feldman.

The kind of thing that he is interested in is what use different members of a family make of Prestel services like Micronet and Homelink.

Other programmes in the series will visit shows, including the Personal Computer World Show, take a look at expert systems and artificial intelligence, and investigate the use of computers in work, in education and in helping the handicapped.

If your family uses a micro and wants to be featured in the programme phone 01-388 5199.



ON THE BOARDS — Gemini Microcomputers has followed up its floppy disk controller board with the GM829. It gives you a Shugart standard interface as well as the floppy controller so that you can add floppies and hard disks to a Multiboard or a Nascom system. The floppies can be 3½in, 5¼in, or 8in units, single or double sided, in single or double density formats, and with 48 or 96 tpi. The industry standard Shugart interface lets you attach Winchester disk sub-systems such as Gemini's own GM835 to your system. All switching is under software control and four floppies at a time can be accommodated. The board costs £167 from Gemini on (02403) 28321.

M-T printer takes on Epson

The most you should wish to pay these days for a multi-purpose, medium speed dot matrix printer is about £250 to £300.

The standard was set by Epson's RX80 (*PCN, issue 8*) and has been further reinforced by a recent printer release from Mannesmann Tally.

This company has, in the past concentrated on the more expensive line-printer market for data processing installations. It now wants to get a piece of the action in the fast-growing micro market.

To this end it has released an 80 cps bi-directional dot matrix printer to compete with the Epson RX80 at around £285.

Its features include logic seeking, with text and graphic printing. Character types are normal, compressed, double height and double width and it has ASCII and Epson compatible codes.

Centronics or RS232 interfaces are available. Another bonus is noise — there isn't much. It is also capable of friction feed, tractor feed and cut sheet handling.

Mannesmann Tally can be contacted at (0734) 788711.



The new M-T printer is aimed at the RX80 market.

ZX81 cut-back

A drop in demand for ZX81 products in WH Smith means that the big chainstore will not be ordering new software titles.

Smith says that it had not done well on ZX81 software and that it had titles on the shelves for as long as six months which were just not selling.

'People are buying more Spectrums,' said a spokeswomen for the company. 'It's really a matter of space. We try and fill our shelves with what the public wants.

'But if people want to buy a piece of software and we don't stock it, we'll order it specially for them.'

At the moment the company has no plans to ditch ZX81s from its stores and will continue to make re-orders for existing software titles.

Although WH Smith's move was sudden a spokesman from Sinclair Research was quick to point out that in no way is the ZX81 being phased out. 'Between the UK and overseas market we're selling about 30-40,000 units a month,' he said. 'There has been a slight decline in sales and it's not doing as well as the Spectrum — but it will remain in production.'

Sinclair expects the ZX81 to continue to sell well, especially overseas, for some years to come.

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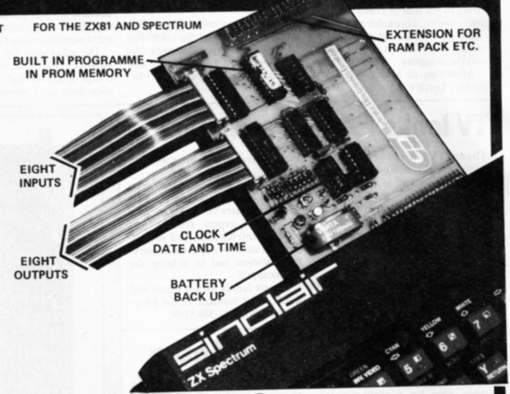
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Notes on a few of the above applications are included in the manual.

ADD ON MODULES which plug into the Time Controller's INPUT and OUTPUT connectors will be available shortly, and will cover most of the above applications.

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Watergrasshill, Co. Cork. Ireland
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Telex: 75444 CTT

'Apple' is a Trademark of Apple Computer Inc.

DEALER ENQUIRIES WELCOME — GENEROUS QUANTITY DISCOUNTS AVAILABLE

NEC means business

Bouncing back into the ball game, Japan's giant NEC has launched its Advanced Personal Computer in the UK. The APC is a top end business computer based on an 8086, 128K RAM, and twin 1Mb 8in floppies.

The most outstanding hardware feature is its dramatic colour graphics, based on a high quality monitor and NEC's own 7220 graphics processor.

Software is based on CP/M86 with GSX graphics support. MS-DOS should be available in the autumn. NEC supplies a range of business software tailored to the system. The Benchmark from Metasoft provides word processing ability. Accounting is based on standard packages from Systematics International. Comshare's Masterplanner covers financial modelling and database management falls on good old dBase II.

NEC has produced its own business graphics and communications packages. The latter group is an important aspect of the APC.

NEC hopes to regain lost ground with the APC. Its earlier foray into the UK with the PC8000 ended in burnt fingers and sales of around 2000 units. The APC is already off to a better but belated start.

Its UK push is marked by a dramatic entry price of only £1,875 (for a monochrome, single disk unit) though little extras such as CP/M (£64) and printer lead (£59) may take the edge off its value. Sales will be through appointed dealers and five major chains including Tesco and John Lewis. The APC is a strong rival to machines such as the Sirius and will compete with forthcoming systems such as the Future Computers FX20 and the ACT Apricot. Contact 01-388 6100.



The APC: sticking its neck into the small business market.



PRINT COSTS — The Infoscribe is a matrix printer for wealthy businesses to get their hands on. Apart from standard features of six or eight lines per inch, bi-directional printing, true lower-case descenders, underlining and so on, the printer has some other extras, at £1,600. It provides business letter characters, high resolution graphics at 40 cps, draft/data processing at 200 cps and correspondence printing at 100cps. For a highly detailed picture a resolution of 144×144 dots per inch can be used. Contact Data Type 06333 71177.

Doubling in personnel

More than twice as many personnel departments have micros this year than last, according to a survey by the Institute of Manpower Studies.

The survey was produced for the Computers in Personnel national conference. Computerisation has caught on in 59 per cent of the organisations sampled as opposed to 40% in 1982.

Of these, nine per cent are using micros in comparison to four per cent in 1982.

Exhibitors at the conference included IBM, Apple and Tandy, which all sell systems catering for the needs of office personnel.

Professor Martin Healey spoke on the office of the future, highlighting the pros and cons of office automation. The cons will include irate customers having too much money taken out of their accounts, and the loss of irreplaceable letters which people may accidentally erase from files.

Delegates were reminded that electronic mail tends to fail if people aren't trained to use it, and that numerous access points are needed to make it really useful.

But all the advice may be slow in sinking in. As one delegate said, 'It's all above my head, really.'

Ace of clubs

A new computer club has been formed to try to knock down the price of hardware, software and peripherals for users.

The Computer Buyers Club (TCBC) hopes to gain the buying power of hundreds of people and in that way buy popular micros and accessories at lower prices than the shops offer.

For further information send a SAE to Barry Edwards, Laneside House, Paddock Lane, Kettleshulme, Stockport, Cheshire.

Educational fun, arcade adventure in games crop

Games for stretching your brains and games for simple fun were among a crop of new software releases last week.

For the BBC B and 48K Spectrum, Chalksoft has Eiffel Tower to test your French vocabulary, Note Invaders to improve your music reading skills, and Pirate, an educational adventure all at £9.25. Spanish Gold, a story book on the screen, is on sale for £7.95. The Spectrum version of the latter two should be out in September and August respectively. Chalksoft is on Worcester (0905) 55192.

Wintersoft's The Ring of Darkness is making the transition from the Dragon 32 to the Oric and 48K Spectrum, and the company's programs are now available from main branches of Boots. Wintersoft is on (01)-367 5720.

The matter of names has obviously been taxing Severn Software, which has added two new titles for the Oric 1 — Dinky Kong, at £6.95, and Oricade, an assembler/disassembler/editor for £8.50. Severn Software is on Dean (0594) 43352.

Computer Rentals, on (01)-247 9004, has four new games for the Dragon 32, Froglet, Laser Racer Skier, and Drag Art all at £6.95.

Genie cost cut

Rubbing your wallet to summon a Colour Genie will cost £36 less from July 21, together with 32K RAM.

After a slow start, Lowe Computers has taken a leading role in the price war, having already cut the 16K Colour Genie from £224 to £194. But the latest price cut to £168, coupled with the increased memory size, gives it the cheapest colour computer with a normal keyboard in the UK.

For a month from July 21 it will be offering extra inducements. With a Colour Genie you'll get 50 per cent off the two-year extended warranty, worth £8.25; 50 per cent off membership of the Colour Genie User Group, worth £5 and a copy of Ian Sinclair's book 'Mastering the Colour Genie', which retails at £5.95.

Lowe has also announced its first cartridge software. The first two items are games called Firebird and Genie Invader, selling between £18 and £25. Also available is a Prestel modem — this is a hard-wired unit that sends at 150 bps and receives at 1,200. It costs £218.

Further down the line Lowe plans to launch a floppy disk drive which it expects will give you the possibility of daisy-chaining three drives on one system.

Lowe is on 0629-4995.

Price war sizzles

The price war is still in full swing in the high streets and those of you with cash to spare still have time to get a cut-price micro in Lasky's sale.

The price of the Apple II has been cut from £649 to £549, and the Apple IIe from £969 to £849. Mike O'Reardon, group manager for the London area, said: 'The Apple IIe should go down still further in the future to bring us in line with our principle competitors.'

The Atari 400 is down to £129.90 including Basic, the old price being £159.90 plus a further £49.90 for the Basic cassette. The Atari 800's price has been cut to £279.

The Newbrain model A will set you back £219 and the Newbrain AD is £249 — down by £50 from Lasky's previous price.

An added bonus in buying a micro from Lasky's is the two-year guarantee it offers.

Mr O'Reardon stresses that you can buy Orics, Spectrums, Vic 20's, Commodore 64's and Ataris at almost all Lasky's branches, but you will need to find a branch with a Micropoint section if you want something costing over £1,000.

The sale will finish around the end of July.

Apple credit cards take off in US

A US credit card for Apple buyers could be making its way to the UK in a different guise.

A marriage between Apple Computer Inc and General Electric Credit Corp, in California, means that a revolving credit facility (like a bankers card) will be offered to buyers of Apple computers. This is thought to be the first machine-specific credit card.

To qualify, purchasers must buy an Apple personal computer and finance at least $825 up-front. As much as 90% of the initial purchase price can be charged by qualified customers, along with subsequent purchases of at least $100 each.

Michael Spring, marketing service manager of Apple UK said: 'It's a sensible idea and it's a reflection of the US market. But, I don't think that that kind of thing will catch on here.

'We're also looking at providing leasing and a few other things are in the pipeline, but nothing is certain yet.

'We've been looking at the idea of having a type of owners club. When someone buys a computer they would receive a card and automatically become a member.'

Spectrum heal thyself

Anyone wanting to check the well-being of their Spectrum may be interested in Micro Doctor, a diagnostic program which checks machine hardware and circuits.

Made by JK Gosden Software of Ashtead, Surrey, the routine is designed to test CPU, ROM, RAM and printer and costs £6.95.

The company is also designing Mentor, a programming aid for programming in Basic, which can be used by beginners or experienced users. This should be out within a month and the price will be about £8.95, according to director Julian Gosden.

Plans are afoot to get the programs sold in major outlets. JK Gosden Software is on 27 76048.



KEY FACTS — It's always the same. Just when you think you have learnt how to use your micro someone comes along with an idea to make it more confusing. Witness this keyboard overlay for the Osborne micros from Impex Micro Products. At £19.95 each, the overlays are meant to remove the need for searching through complex manuals to find out how to use Wordstar, Supercalc, MBasic and dBase II. Now all you will have to cope with is a complex keyboard overlay which comes in a 'hardwearing, non-scratch, colour co-ordinated plastic finish'. Impex is on Leighton Buzzard (0525) 371597.

IBM USER SHOW

IBM cuts show

By David Guest

Like a party without the guest of honour, the IBM User Show at Wembley last week sadly missed IBM. The giant stayed at the top of its beanstalk.

Not that IBM would necessarily have rocked the micro world to its foundations with a revolutionary new product to mark the show, but it would certainly have drawn many more exhibitors, many more visitors, and probably many more product launches had it deigned to attend.

As it was, the exhibitors had the air of people who pick crumbs from the rich man's table, and new releases — particularly for the PC and XT — were thin on the ground.

Pete and Pam came up with the goods in a tape-streamer back-up for the XT. From the US manufacturer Sysgen, this device has a capacity of 20Mb, is PC-DOS2 compatible, and offers you selective back-up or a full dump — a process that takes about 20 minutes.

The unit costs $1,000 in the US. When production quantities are available in the UK it will probably set you back £850. Pete and Pam expects to have more samples by the end of this month.

Micro Focus was demonstrating its Personal Cobol, which it says conforms to the full Ansii 74 standard. To use Personal Cobol you'll need at least 128K of RAM and twin double-sided floppies.

Cobol on a PC might look like a sledgehammer to crack a nut, but Micro Focus sees it as a means of letting existing PC users develop source code on the PC for end-user applications. Alternatively it could be another means of learning to program, and some of its features—for example the symbolic debugger — looked particularly impressive.

Personal Cobol will be available off the shelves in two or three months' time, and it will cost £250.

Micro Focus deserves a bonus point for its stand, which resembled a waltzer. Sadly for its staff the lights needed to create this effect made it much hotter than most, and the atmosphere in the Exhibition Centre was already tropical. On one stand a fan over-heated.

There were also unconfirmed reports that the parrot on Mohawk's stand had to be regularly sprinkled with cold water to keep it upright on its perch.

There was a general air of torpor about the hall, and the smell in certain quarters (not unadjacent to the ailing parrot) was unpleasantly ripe, but the show went on. Tamsys boldly proclaimed 'the first of the second generation' database systems, Knowledge-Man. With fifth generation computers, fourth generation database and second generation databases there is obviously room for a third generation jargon clearance scheme.

Knowledge-Man is a relational-style DBMS for the PC with a built-in spreadsheet system and screen management functions. In demonstration it looked fast and easy to use, but perhaps it had better be because for £350 you won't get much hand holding.

On the promotions front SoSoft was offering Tomorrow's Office software to all buyers of the Tallgrass Winchester sub-system for the IBM PC, the offer to close at the end of August.

TDI, more modestly, has cut the price of Dataflex RAM cards by 20 per cent — this brings a 64K unit to £260.

And finally in the executive gimmicks line Geac demonstrated its Display Phone, 'the ideal management communication device'. It gives you simultaneous voice and data transmission plus access to IBM mainframes, Prestel, Telecom Gold, and sundry other networks; and it will look particularly natty on your desk.



The Display Phone from Geac — status symbol or serious terminal?

PCN Charts

You've followed the micro charts — now here's the games top 30 compiled from both independent and multiple sources across the nation. They reflect what's happening in high streets in the two weeks up to July 7 and, like the micro charts, do not take account of mail order sales. We'll be keeping them up to date, showing new positions every two weeks, so watch for the changing status of your favourite games.

The micro charts this week show the number of machines sold in the

GAMES

Top Thirty



			GAME TITLE	PUBLISHER	MACHINE	PRICE
►	1	(1)	The Hobbit	Melbourne House	Spectrum	£14.95
▲	2	(20)	Jet-pac	Ultimate	Spectrum	£5.50
▲	3	(9)	Trader	Quicksilva	Spectrum	£9.95
►	4	(4)	The King	Microdeal	Dragon	£8.00
▼	5	(2)	Arcadia	Imagine	Spectrum	£5.50
▲	6	(9)	Gridrunner	Llamasoft	Vic 20	£6.00
▼	7	(5)	Transylvanian Tower	R. Shepherd	Spectrum	£6.50
▲	8	(17)	Penetrator	Melbourne House	Spectrum	£6.95
▼	9	(6)	Horace Goes Skiing	Psion	Spectrum	£5.95
▲	10	(24)	Frenzy	Quicksilva	Spectrum	£4.95
▲	11	—	Ah Diddums	Imagine	Spectrum	£5.50
▲	12	(16)	Crazy Kong	Interceptor	Vic 20	£6.00
▲	13	—	Killer gorilla	Micropower	BBC	£6.95
▼	14	(4)	Flight Simulation	Psion	Spectrum	£5.95
▼	15	(7)	Miner 2049er	Big Five	Atari	£28.95
▼	16	(13)	Moon Raider	Micropower	BBC	£6.95
▲	17	(18)	Panic	BugByte	Vic 20	£7.00
▲	18	—	Black hole	Quest	Spectrum	£6.00
▲	19	(21)	Schizoids	Imagine	Spectrum	£6.00
▼	20	(19)	Zaxxon	Datasoft	Atari	£29.90
▲	21	—	Time gate	Quicksilva	Spectrum	£6.95
▼	22	(9)	Attack of the Mutant Camels	Llamasoft	CBM 64	£8.50
▲	23	(27)	Planet of Death	Artic	Spectrum	£6.95
▲	24	—	Everest	Richard Shepherd	Spectrum	£6.50
▲	25	—	Xenon 1	IJK	Oric	£5.50
▲	26	—	3D Combat Zone	Artic	Spectrum	£5.50
▼	27	(25)	Maze Death Race	PSS	Spectrum	£4.95
▲	28	—	PSST	Ultimate	Spectrum	£5.50
▼	29	(7)	Parsec	Texas	TI 99	£25.95
▲	30	—	Knot in 3D	New Generation	Spectrum	£5.50

PCN Charts

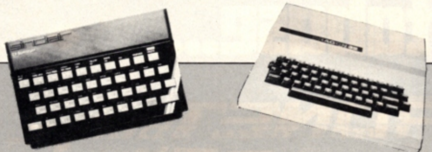
two-week period ending two weeks before publication date (July 21), so they tell the story in the high street between June 23 to July 7.

Neither mail order nor deposit-only orders are included and the prices quoted are for the no-frills models and include VAT. Information for the top-selling micros is culled from retailers and dealers throughout the country and, like the games, will be updated every alternate week. Watch the arrows to see how they're doing.

PCN Charts are compiled by MRIB (Computers), London, (01) 408 0250.

HARDWARE

Top Twenty up to £1,000



MODEL		PRICE	DISTRIBUTOR
► 1 (1)	Spectrum	£99	(SI)
► 2 (2)	Dragon 32	£175	(DR)
▲ 3 (5)	BBC B	£399	(AC)
▼ 4 (3)	Vic 20	£150	(CO)
▲ 5 (6)	Atari 800	£300	(AT)
▼ 6 (4)	ZX 81	£40	(SI)
▲ 7 (8)	Oric	£99	(OR)
▼ 8 (7)	Atari 400	£150	(AT)
▲ 9 (13)	CBM 64	£350	(CO)
▲ 10 (11)	TI 99/4A	£150	(TI)
▲ 11 (12)	Colour Genie	£168	(LO)
▼ 12 (9)	Newbrain A	£228	(GR)
▼ 13 (10)	Lynx 48	£225	(CA)
▲ 14 (16)	Sharp MZ80A	£549	(SH)
► 15 (15)	Apple 11e	£969	(AP)
▲ 16 (17)	Sord M5	£190	(SO)
▼ 17 (14)	Epson HX20	£472	(EP)
▲ 18 (20)	Tandy Colour	£240	(TA)
▲ 19 (—)	Sharp PC1500	£169	(SH)
▼ 20 (18)	Nascom 3	£549	(LL)

Top Ten over £1,000

► 1 (1)	Sirius 1	£2,754	(ACT)
► 2 (2)	IBM PC	£2,392	(IBM)
▲ 3 (6)	Olivetti M20	£2,754	(OL)
▼ 4 (3)	Apple 3	£2,780	(AP)
▲ 5 (7)	Dec Rainbow	£2,714	(DEC)
▼ 6 (4)	Osborne 1	£1,581	(OS)
▲ 7 (9)	HP86a	£1,541	(HP)
▲ 8 (—)	Epson QX10	£1,700	(EP)
▼ 9 (8)	Superbrain	£2,150	(IDS)
▲ 10 (—)	Commodore 8096	£1,195	(CO)

AC Acorn Computers. **ACT**— ACT Sirius. **AP**— Apple Computers. **AT**— Atari International. **CA**— Camputers. **CCS** — Colt Computer Systems. **CO** — Commodore. **DEC** — Digital **DR** — Dragon Data. **EP** — Epson. **GR** — Grundy Business. **HP** — Hewlett-Packard. **IBM** — IBM. **IC** — Icarus Computers. **IDS** — Intertec Data Systems **JU** — Jupiter Cantab. **LO** — Lowe Electronics. **LL** — Lucas Logic. **OL** — Olivetti. **OR** — Oric. **OS** — Osborne Computers Corporation. **SH** — Sharp. **SI** — Sinclair. **SO** — Sord. **TA** — Tandy. **TI** — Texas Instruments.



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RANDOM ACCESS

Don't carry a LOAD on your shoulders, unburden yourself on *PCN*'s letters page.



Share your thoughts in the UK's liveliest micro weekly letters columns. Funny, feisty or fanciful, your letter could win you £10 if it's of star status.
WRITE TO: Random Access, *Personal Computer News*, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

Ode to the curious minds

I've taken *PCN* since first I saw
It shining like a star upon the shelf;
And now my grovelling's done, I can once more
Let out the weird ideas I hold myself.

I hear the screaming software houses shreik,
And struggle to prevent the onward surge
Of curious types who merely want to PEEK,
And prefer, instead of LOAD, to enter MERGE.

And there it is for all who wish to see:
Addresses, USeR calls and more beside;
So those with disassemblers, just like me,
Can wander through the code they seek to hide.

PCN £10 Star Letter



And are these not the very firms that shout
How badly they need programmers and ideas?
Why hide good code that really they should flout
To stimulate, set standards and raise cheers

Or can it be the code does not compare
To prices charged for glossy wrapped cassettes?
And can those balance-book minds be really fair
To those of us who can't afford such bets?

So to make a copy cannot be a crime,
No more than singing songs that others write;
But then to sell for profit, at any time,
Is just plain theft, deserving of the fight.

Forget not though, those leaving school with schemes
For jobs that don't exist; theirs is the role
In which our future lies. For all our dreams
Give them a Spectrum, courtesy of the dole.

For in the real world, a video invader shot,
Is an aggression eased and an intellect inspired.
In the digital world to come, is a melting pot
Of uncertainty and fear to be desired?

So let the games be played, let keyboards sound,
Let the new technology be rife.
For every time a curious mind is found,
A future is assured, and so is life . . .

I am a radio amateur call sign GW6JJN and wonder if other amateurs who are also Spectrum users would like to contact me to further computing in our hobby. My address is in the Radio Amateur Callbook under my call sign.
Ray Berry
Dyfed, S Wales

Tempers rise as people take
Opposing sides in this debate
But for your wit and careful rhyme
You take the RA prize this time! — Ed

Help! Reviews only confuse

Nearly every computing weekly these days contains pages of software reviews. I usually enjoy these reviews, but one instance in last week's magazines would baffle any beginner to the micro games.

Horace and the Spiders was the game. I opened my magazines to the software reviews. One magazine said 'excellent, well laid out keys . . . 100 per cent value for money'. Great, I'll rush down to the shops and get it once I've finished *PCN*.

But I found Horace in *PCN*, too. 'Awkward key layout . . . difficult to control . . . 60 per cent value for money.'

Oh oh, now what? Other ratings were also lower and the highest was use of machine which scored lowest in the other magazine.

If reviews are written to help people pick software (*PCN Issue 11*) please make them a little less confusing!
Alan Meehan
Shannon, Co Clare
Ireland

We certainly do review new products to let you know what we thought of them after a thorough testing. But as often said in these columns, opinions vary. But we stick to ours . . . Ed.

Theft by any other name

I take extreme exception to the letter by Lyndon Martin (*PCN*, issue 14).

Mr Martin's letter seems to voice an all too common attitude toward software theft, that is it's OK to steal someone else's product if it is beyond one's means or if one feels the product is over priced.

No matter how you justify it theft is theft, and stealing software is no exception.

I agree the vast majority of theft is caused by the manufacturers themselves though not for the reasons Mr Martin might suspect. In my mind the problem is caused by supplying the software on an easily duplicated media.

It is our company policy not to distribute any of our software on anything other than ROM cartridge. This obviously increases the price of the product substantially, particularly when 16K programs are involved. Since very few people have Eprom programmers and blank ROM cartridges handy this pretty well ensures that our software will not be easily ripped off.

We also offer *bona fide* computer clubs the same discount we offer dealers for bulk purchases.

I'm sure Mr Martin, and others like him, would not have the same attitude towards stealing software if they were the authors and receiving royalties on sales. I also suspect that Mr Martin has no idea of how costly it is to develop a software product, thoroughly debug it, document it, manufacture it, package it, advertise it, and support it. If the manufacturer and the author don't get a reasonable return on their investment what incentive do they have to either do it again or to support the product they just created?

I can only warn Mr Martin and others like him of what is likely to happen to cassette based software if they don't stop stealing it. My warning is this: remember how much cassette based software was available for the Commodore Pet when it was first released? Remember how hard it was to find cassette based software for the Pet two years later?

If a manufacturer finds his sales dropping due to plagiarization he will simply stop making cassette based software.

Last, but by no means least, I feel it is your duty as a magazine to convince your readers that theft of software, no matter how expensive, is not only illegal but is also going to destroy the very market they wish to see flourish.
William C Dickinson
Director, Windrush Micro Systems Ltd, Norfolk

Do you have an opinion?

Am I alone in liking the Dragon/Microsoft line editor? I have read no end of grouses about it in the micro press and I wonder if these complainers have given enough time to learning to use it.

J Skidmore (*PCN June 30*) writes of the "X" command being a useless one. I find this one of the more useful commands. It extends the line being edited by moving the cursor to the end of the line and going into insert mode. From this position it is easy to either delete characters on the end of the line or simply key in additions to the line.

Other grouses I've read are of similarly misunderstood functions. Apart from the lack of a repeat key, which can always be programmed in if really wanted, I find the editor quite friendly and easy to use.

Anyone else out there agree?
Stephen Bell
London W5

Do the Aye's have it? — Ed



ROUTINE INQUIRIES

Lost in a maze of bits and bytes, trapped in a forest of errors, or bugged by Basic? Whatever your problem, access our HELP function . . . better known as Max Phillips.

Write to: Max Phillips, Routine Inquiries, *Personal Computer News*, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

A little ZX Logo

Q I have recently bought a Sinclair Spectrum and am having great fun with it. I've played lots of games and have started to learn to program.

I've used DRAW, PLOT and CIRCLE but I find it's quite difficult to build up the shapes I want. I've heard that the language Logo makes graphics a lot easier with commands such as Forward, Left, Right and so on. Can I get Logo to run on the Spectrum?

Martin Cleave,
Ipswich, Suffolk

A You can get tiny subsets of Logo for the Spectrum — there isn't room for a full version of the language. Many of the so-called Logos you'll come across are also sold to work with real turtles . . . putting up the cost a bit. But you don't need Logo for the sort of graphics you're talking about.

Logo uses turtle graphics. It's just a tiny part of a serious and powerful language although many people get the two horribly confused. You don't need one for the other. It's easy to set up mock turtle graphics in Spectrum Basic for example. The routines listed below give you the basics of a turtle graphics system.

The hero is the turtle . . . an imaginary beast that sits at the last spot you plotted to and is facing a direction from 0 to 360 degrees. All you need for turtle graphics is to be able to turn the turtle so many degrees and to walk it forward so many pixels. PEN colour (INK on the Spectrum) and the ability to reset the display (CLS) are also handy.

The first subroutine is the turn command. Just set x equal to the number of degrees to turn and GO SUB 1020. For example, LET x=90 turns right, LET x=180 turns around and LET x=−90 (or 270) turns left. To force the turtle to a particular direction just LET x equal the direction from 0 to 360.

To walk so many pixels, just set x and GO SUB 1510. You could add a few checks in here to avoid walking off the screen. Finally, GOSUB 2010 resets the turtle, clearing the screen, sticking it in the middle facing 0.

The best bit of these 'routines' is that you can mix them with the ordinary PLOT commands. Use PLOT to fly the turtle to anywhere on the screen for example — you've got turtle graphics mixed with the Basic.

To let you try the turtle out, I've tacked a little 'front end' onto the front of the routines. This accepts commands like 'T90' and 'F10' to turn and move the turtle. It's worth a quick play . . .

```
 100 REM Turtle demo
 110 GO SUB 2010
 120 PRINT AT 20,0;"Turtle at ";
PEEK 23677;",";PEEK 23678;" faci
ng ";t;"  "
 130 PRINT "Commands R,In,Tn,Fn
P Q"
 140 INPUT a$
 145 IF a$>="a" AND a$<="z" THEN
 LET a$(1)=CHR$ (CODE a$-32)
 150 IF LEN a$>1 THEN LET x=VAL
 (a$(2 TO )): LET a$=a$(1)
 160 IF a$="P" THEN COPY
 170 IF a$="R" THEN GO SUB 2010
 180 IF a$="I" THEN INK x
 190 IF a$="T" THEN GO SUB 1020
 200 IF a$="F" THEN GO SUB 1510
 210 IF a$="Q" THEN CLS : STOP
 220 GO TO 120
1000 REM Turn X
1020 LET t=t+x
1030 IF t<0 THEN LET t=360+t
1040 IF t>360 THEN LET t=t-360
1050 RETURN
1500 REM Forward X
1510 DRAW SIN (t/rd)*x,COS (t/rd
)*x
1520 RETURN
2000 REM Reset
2010 PAPER 7: CLS : INK 7: PLOT
128,96: INK 0
2015 LET rd=180/PI
2020 LET t=0
2030 RETURN
```

Spectrum Turtle — see *A little ZX Logo*

Cheaply into print

Q I am looking for a good cheap printer for my 48K Spectrum. In *PCN issue 14* I noticed that Basicare was offering a new 80-column dot matrix printer drive for £41.75. Could you tell me Basicare's address and if possible, mention other low priced printers?

C Norman,
Leeds, West Yorks

A Basicare is at 12 Rickett Street, London SW6 1RU. But you should hold your horses for a moment. The device referred to is called 'Pericon c' and is an interface for a printer, not a printer itself.

It's also part of Basicare's 'Organic micro' system. This is a system of plug in modules that lets your system get bigger and bigger. But you do need to buy the 'Persona' base module before you can buy any of the others. If you want to get into a big expansion system, you could try this, but if all you're after is an interface then look elsewhere.

Probably the cheapest presentable printing will come from an RS232 interface (for example Cobra Technology's Quantum Jump interface) coupled to a Seikosha dot matrix printer. If you can afford it, you'll get a better performance from machines like the Epson RX80 and CTI CP80. These use Centronics interfaces . . . also easily available from firms such as Kempston Microelectronics and Hilderbay.

Animation on the BBC

Q I'm writing a program for my BBC Model B that needs the effect of sprite graphics (that is, one object moving behind another). I've seen this done in some commercial programs . . . how is it achieved?

Also, how can I get different characters moving simultaneously? I know that for games like space invaders the characters can be placed in a long string and moved all at once.

Richard Shepley,
Godalming, Surrey

A It's all possible . . . it's just a lot of hard work. Sprite graphics give you more than just 'priorities' (that's objects pasing behind each other). They also allow many complex shapes to be moved effortlessly round the screen. The BBC has no such hardware and it's up to you to program it yourself.

If you are trying to get a foreground/background effect, there are a couple of tips that will help. You can crudely force blocks of colour into the foreground by simply replotting them every time you update the screen. Use the triangle fill (PLOT 85) as it needs to be quick.

A much neater trick is to use exclusive-or plotting. Link the text and graphics characters together with VDU 5 then set the text colour with GCOL 3. If you use X-OR to plot and unplot objects as they move, they will slide across the top of a background leaving it undisturbed.

Depending on what you're after, you may find the other 'logical plotting colours' will be useful.

Moving lots of things at once presents similar problems. The bread and butter technique is to base programs on a loop. On each pass through the loop, everything gets updated and moved.

This suggests that objects are stored in a table, giving their co-ordinates, direction and speed. The loop can just update each object in turn.

Again your problem will be speed. Use user-defined characters . . . they're much faster than PLOTting. Try and minimise the number of different objects.

Strings of space invaders (much like sausages) is the good example you already know. And now you know why games like Surround, Bomber and Pacman are popular with beginners!

With a machine like the BBC, good graphics are the product of hard work and programming experience. Eventually, you'll need to write in assembly language but you can get a lot of practice from Basic.

And keep watching commercial tapes . . . you buy them for the skill that's gone into producing them; they can provide wonderful ideas.

Ins and outs of the Newbrain

Q ***PCN* Microwaves in issue 18 described a way of finding out the address of the Newbrain's graphics screen. But what do you do for the normal text screen? I'm bogged down in wordprocessor and spreadsheet programs until I can get at the screen.**

The handbook hints that there might be a way round this using control codes 20 and 21 (Control T and Control U). These are supposed to return the cursor character and position but I haven't made them do anything.

I'd also like a quick way to release the cassette motor so I can rewind and position the cassette during a run. At the moment, I usually press STOP, enter VERIFY and then restart the tape.

Finally, I've a couple of printer problems. Can you send lines longer than 80 characters to the printer? A carriage return seems to be sent automatically after 80 characters but my printer can handle 96 and 132 columns per line. I also find that the printer port produces double spaced lines. What is the explanation?

A D Temple,
Richmond, Surrey

A From the start, it's best to avoid memory locations and such gubbins on the Newbrain. They may work now but perhaps not on expanded machines. Besides, you've got that copiously equipped operating system and screen editor for most of your needs.

You're right that it's Control T and U that you need. These do things in a strange but not unworkable way. If you send a Control T to the screen, the code for the character under the cursor appears in the input stream! So, if you're working with the default screen and keyboard streams, you can read the character under the cursor with PUT 20:GET c.

A similarly curious thing happens for the position of the cursor. PUT 21: GET x,y will read its co-ordinates into the variables x and y. Coupled with PUT 22,x,y to place the cursor at a certain point on the screen, you should be able to do everything you want.

I haven't found a neat way to switch the cassette motor on and off during a run. STOP and VERIFY is one way. Or pull the remote jack . . .

Many people have come across the 80-character limit to printer lines. R W Tuley came up with a fix in *PCN Microwaves issue 12.* As for double spaced lines on the printer, it sounds like a problem with line-feeds.

Many computers don't bother with the traditional carriage return-line feed (CRLF) sequence for ending lines. Instead, they send just a CR. So many printers get smart and do their own LF whenever they get a CR. In the Newbrain's case, it sends out a CR (the printer throws in an LF) followed by a LF. Hence two line feeds.

So the first thing to do is join the HALF society. That's 'Humans Against Line-Feeds'. Next, have a look in your printer manual to see if you can turn off the 'automatic line-feed on carriage return' feature. Usually, this is a DIP switch in some inaccessible part of the printer's insides.

If this fails, play dirty. Send the printer the appropriate control codes to halve its line spacing. It's a dirty and temporary trick but it saves getting the screwdriver out if you're in a hurry.

One too many for the Atari

Q **I own a 48K Atari and have encountered a problem at the end of a very long program. When I try to define a 129th variable, I get 'Too many variables' error.**

I could go back and place some of the variables in an array but this would be very time consuming. Is there an easy way to solve this problem?

Derek McLaughlin,
Dundee, Scotland

A 129 variables? You can't be serious! Unfortunately, Atari Basic is limited to a very generous 128 variables.

But why on earth do you need so many? Many Basics limit you to 26 variables and it doesn't restrict people. You should try and minimise the number you use. Variables are reusable.

Provided you're careful about - re-using variables that appear in loops and subroutines, you should find life much easier.

If you do have piles of related information (such as prices, co-ordinates, names and so on) then use arrays. You'll find they make the programming much easier as well as shorter.



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Lynx DIY messages

Lynx owners can produce their own set of error messages by using the monitor. First DPOKE &629A,40000. This changes a pointer to the error messages from their ROM location to a RAM location. From the monitor, type T 9C40 (no RETURN) followed by up to 26 messages each terminated by a full stop. The first message will correspond to error 1 (out of memory). . . see Appendix 1 in the manual.

The messages should be separated by an ASCII 0. So after pressing RETURN to enter your messages, enter M 9C40.

Now step through each address, pressing RETURN if the Lynx prompts with any hex number but 2E or entering 0 RETURN if you get a 2E. This process will change all the full stops into ASCII 0s. When you've been through all your error messages, enter J to try out your 'special' Basic.

You might also try POKE 25145,0 and 1. POKEing this location with 0 turns off the shift lock, a value of 1 will turn it on. Finally, POKE 25266,40000 makes programs unlistable. Use POKE 25266,58819 to get back to normal.

Simon Brookes,
Abingdon, Oxon

Beeb keyboard bypassed

Any BBC users still lumbered with the sub-spec 0.1 MOS may be jealous of the *FX 138 call available from MOS 1.0 onwards. This puts characters straight into the keyboard buffer. This Procedure will allow you to do this with MOS 0.1.

The keyboard buffer is between locations &3EO and &3EF. The present position in the buffer is pointed to by location &234 with &23C pointing to the last character entered. The difference between these two are characters still to be processed. This procedure increments the second pointer and stored characters in the buffer to imitate *FX 138.

To use the Procedure, enter PROCstring("Hey Look") or to enter single characters use PROCcharacter(13). As an example, suppose an INPUT wants an answer of YES or NO and NO is the expected answer, you could use

100 PROCstring("NO")
110 INPUT "are you sure (YES/NO)";A$

You may also find it useful to clear the buffer by using ?&23C = ?&234.

Bob Thompson,
Reigate, Surrey

```
 1000 DEFPROCstring(a$)
 1010 LOCAL x,c,flag:flag=FALSE
 1020 FOR x=1 TO LEN a$
 1030 c=ASC MID$(a$,x)
 1040 DEFPROCcharacter(c):LOCAL flag:fla
g=TRUE:?(&300+?&23C)=c:?&23C=?&23C+1: IF
 ?&23C<&E0 THEN ?&23C=&E0: IF flag THEN
ENDPROC:NEXT:ENDPROC
```

Direct entry — see *Beeb keyboard bypassed.*

Wildcat sound

It can get tedious POKEing random numbers into memory to produce white noise on the Lynx. Users may be glad to know that SOUND from location 1836 provides suitable white noise . . . just try SOUND 1836,90. Great for explosions and so on.

Andrew Poon,
Newark, Nottinghamshire

Line copy on the Oric

If you are editing lines on your Oric, you may find this a useful dodge. Call the line for editing with EDIT *line number*. Then enter Control-D (hold down CTRL and press D). Now, when you use CTRL-A to copy in the line, you'll get a copy of where you're up to on the line below. This can help to sort out any confusion about what has been copied into the EDIT buffer.

Remember to turn off the double printing after editing with another CTRL D.

H S Lim,
Moss Side, Manchester

Musical keys on a Tandy

This short routine for the Tandy Color Computer produces different note each time a key is pressed.

10 CLEAR 200,16370
20 REM LOAD MACHINE CODE
30 FOR X=1 TO 11 : READ A$
40 POKE 16370+X,VAL ("&H"+A$):NEXT
50 REM SOFTWARE INTERRUPT VECTOR
60 POKE 256,&H7E
70 POKE 257,&H3F
80 POKE 258,&HF3
90 REM KEYBOARD INTERRUPT VECTOR
100 POKE 362,&H11
110 POKE 363,&H3F
120 POKE 364,&H39
130 DATA 8B,90,97k,8C,CC, 00,01,BD,A9,51,3B

Once the program has been run, you can NEW it and load another program without losing the keyboard bleeps.

R M Maloney
Bradford, Yorks

TRS-80 says it again

An easy way of producing a key repeat on Model 1 Tandys is to zero the RAM buffer that INKEY$ uses. This starts at 16438 and ends at 16444. It is divided up as follows:

Buffer	Ram address
@—G	16438
H—O	16439
P—W	16440
X—Z	16441
0—7	16442
8—/	16443
Enter — Space	16444

So, if you were using just the keys 0 to 7, you would only have to POKE 16442.

Gary Elverstone,
Romford, Essex

Character creation

These short mods to the PROG program supplied with the Lynx will turn it from a game into a tool you can use when designing your own characters.

DEL 110,120 (deletes intro), DEL 190,200 (deletes characters for gun etc) and DEL 1290,1850 to delete the game.

Now add 815 PRINT#A; and 816 VDU 8,22,22, 8,8,12,12,12,12. These lines will tabulate the hex values needed for your CODE lines.

J H Rawlings,
Brentford, Essex

Click with your Spectrum

The Spectrum's BEEP command is controlled in software. So giving out continuous 'clean' noise while other things are happening on the screen is difficult.

However, it may be useful to know you can produce a series of short clicks by setting the border variable. Try this:

10 LET border = 3
20 OUT 228,16+border: OUT 228,border
30 REM Action routine
40 DRAW RND*240-PEEK 23677, RND* 160 — PEEK 23670
100 GO TO 20

John Isaacs,
Bournemouth, Dorset

Get protected

Hundreds of ways have been proposed to protect Basic programs. One of the simplest Oric tricks is to put 0 DOKE#1B,DEEK (#FFFC) at the start of programs. Then, when the program is RUN or AUTOed, any attempt to use CTRL-C, press Reset or delete a line will result in a hard reset. Crude but effective.

C Innis,
Bangor, County Down

ZX printout

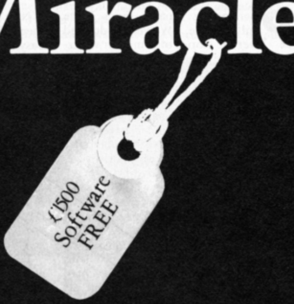
There's a quick way of directing Spectrum output to the printer. After the command OPEN#2,"P", everything sent to the display file will go to the printer. To reset things back to normal use CLOSE#2.

Richard Desforges,
Reading, Berks



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In the hard, logical world of computers, how great a place is there for art, asks Kathryn Kustance

'Programming Protégé Finds Fame and Fortune.' We've all drooled over the stories of computer whizz-kids who make thousands a day from their games programs. But what we don't read about is some of the true pioneers of programming — Britain's young artists.

Even though most micros now have good graphics and computer graphics are increasingly used on television, computer art is still considered a joke by most artists. How can you be truly creative if you get the computer to do all the work for you? What's creative about programming?

One person who has tried to fight against this 'establishment' view of art is Nicholas Pigram. He has just left Cheltenham Art College and despite his earlier problems getting his programmed pictures accepted he has left with a 2.1 degree in fine art without lifting a pencil.

Nick's early work was in the area of 'kinetic' art, getting the computer to control objects. He wrote some machine code programs to switch light boxes on and off in patterns. He then learnt Applesoft Basic and used a program converted from Pascal with Hilbert's curves, (a set of shapes that look like staples.) When these shapes are repeated on the screen they form interesting patterns.

The problem facing Nick was how to get these pictures printed so they looked attractive enough for him to pass his exams. All the college had was a dot matrix printer. So for some time it was possible for Nick to show his work only on the black and white TV or as a poor quality print out. The college then bought an X Y plotter, a graphics tablet, a colour TV and an Apple IIe. With this new equipment Nick could experiment with colour and more complex designs.

He now works with three programs, two written by himself and one written jointly with lecturer John Fish. These programs are called SHAPEFILER, TABDATA and TABPLOT.

Shapefiler was the program written by Nick and John. This allowed Nick to create shapes on the graphics tablet and then store these on disk to be manipulated later on the screen using the Tabplot shape editor program.

Nick found it difficult to produce accurate shapes using the graphics tablets and so devised the Tabdata program. Tabdata uses simple vector graphics. It uses the screen as if it were a piece of graph paper with an x-axis 280 points across and a y-axis 192 points vertically. Each line shape is plotted using the x and y coordinates at each end. These shapes can be changed by putting in new data statements.

Once Nick had created a library of shapes he was ready to use Tabplot. He describes Tabplot as a word processor for shapes: 'I can draw, erase, move, rescale and rotate lines and shapes previously stored on floppy disk. This allows me to compose and draw repeated lines in a way which would be impractical by hand.'

Nick's programs all have a very simple menu driven format which makes them easy and quick to use. The end result is a sophisticated package, but the actual mathematics and programming used are fairly basic and can be understood by anyone with O-level maths.

The rotation of shapes is achieved by using a simple matrix:

$x \cos \varnothing - \sin \varnothing$

$y \sin \varnothing - \cos \varnothing$

where Ø is the angle of rotation in radians and * = multiply

When this is translated into Applesoft Basic it looks like this:

```
x, = x * cos Ø + y * (-sin Ø)
y, = y * Sin Ø + y * cos Ø
```

To identify different shapes Nick has used Pythagorus' theorem and to make lines move in a certain direction he just adds numbers to the x and y coordinates. All of these are techniques you can use at home to develop your own design program.

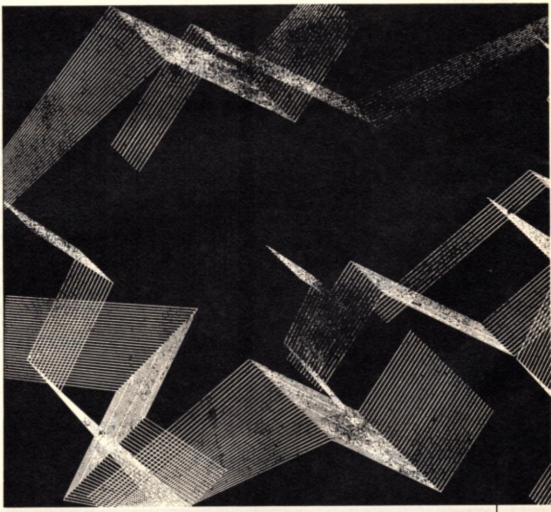
To produce your own designs you don't need to buy expensive equipment, you don't even need a colour computer. Nick has produced some very effective designs at home on his ZX81 using a ZX printer. He has his own program called Draw which uses a cursor to draw and erase lines and then print these out on the printer. By pulling the paper from side to side as it comes out of the printer he makes unusual patterns.

Now that Nick has a decent plotter he can be more adventurous with his pictures. He has written a routine for the Apple which will plot alternate lines in different colours and has also used the plotter to make acetate plates. He fits the plotter with a rotary pen which draws onto a piece of clear film. This can then be made up into a zinc plate to produce etched prints. The problem with using colour felt tipped pens in a plotter is that the colours fade and it is difficult to control the thickness and regularity of the lines. Etching gives a very even and professional finish.

Nick has recently joined the Computers in the Arts Society in London, but would like to hear from anyone using a computer for design work. You can contact Nick at 24 The Ridgeway, Hitchin, Herts.



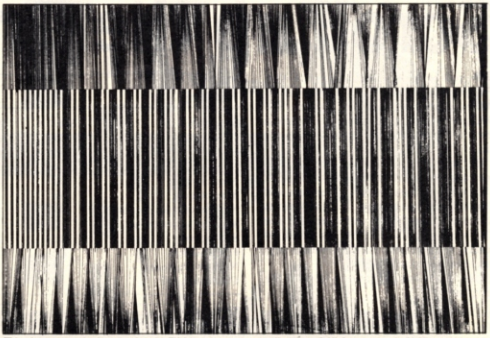
The artistic m



The picture above is from etched zinc plates. The plotter is used to draw on film and chemicals are used to bite the design into a smooth zinc plate. The mottled background is created using powder to protect the plate from the acid. This technique gives a clearer, longer lasting picture than using straight plotting.

Nick Pigram with his artistic Apple.



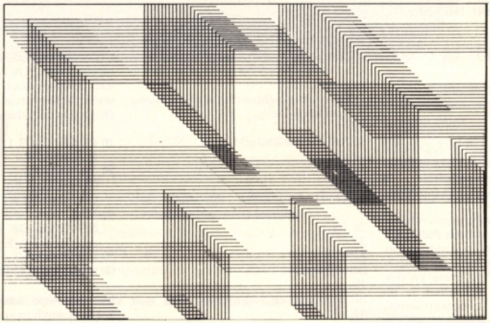


This picture was produced using the ZX 81 and a program called 'Draw'. Nick uses simple PLOT and UNPLOT commands to draw and erase on the screen.
When the screen is dumped on the printer he twists the paper to get this irregular pattern. This picture is made from three print outs.

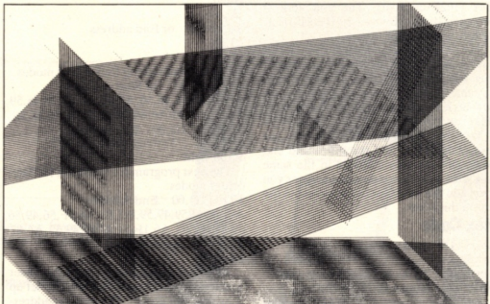
icro



This picture uses the simple techniques of overlapping coloured lines. This creates interference or 'moiré' patterns. In this case the mixture red and blue produces a yellow/green colour.



This is an example of alternative line options. The ploter program allows you to plot the first set of shapes in one colour. Then you can swop the pen over and fill in the gaps with another colour. Nick added this option to his program to explore optical mixing. For example, if you mix blue and green the brain interprets it as green. This produces more vibrant colours.



Scroll up . . . or down or sideways with Darren Eteo's moving routines for the Welsh micro.

Scroll up the Dragon

Scrolling is a useful operation that provides much of the excitement for sideways — scrolling games like Defender. On the Dragon you can use a few small machine code routines to achieve this.

But to make the best use of them, it is necessary to load the routines from tape. It is a good idea to use DATA statements and store the routines on tape, loading them as you need them. You can even use the CSAVEM and CLOADM. As an added bonus, the routines may be loaded anywhere in memory.

Use the following routing to load the program:

```
10 DATA , , , , etc.
20 CLEAR 300,30000 : REM OR
      WHATEVER VALUES YOU
      THINK APPROPRIATE
30 X=30001:'THIS IS THE VALUE
      YOU EXEC AND CSAVEM. IT
      ALSO MAY BE CHANGED TO
      PUT ROUTINES IN DIFFERENT
      PLACES'
35 READ A$
40 POKE X, VAL ("&H+A$):X=X+1:
      GOTO 35
```

When the routine is in memory an error will occur so you must save it as a machine code routine.

The numbers below should be typed into data statements. They are in Hexadecimal.

```
8E,06,20,   Start address and offset
EC,88,20,   Bytes across screen and offset
ED,81
8C,1D,DF,   End of address minus offset
```

The program works in both PMODEs 4,1 and 3,1. Changing the start address and end address (minus offset) you can scroll in any mode (See tables elsewhere on this page. For Mode 1-5 the offset is 32 decimal). For example, to convert scrolling Mode 4 change the start address to 04 00 Hex (1024 decimal). The end address becomes 10 00 (Hex) — 20 (Hex) (or 32 decimal) gives 09B0.

The offset is changed to 32 (Hex). If you have difficulty working with Hex numbers, then use Hex$ and &H to make it easier. Try changing the offset to 1,2 or 40 (Hex), 60 (Hex), 41 (Hex), 39 (Hex), 21 (Hex), 19 (Hex) and so on.

To scroll down the hex numbers are loaded as before and the offset and end addresses are accomplished in the same way. But to work out the start address you must add the offset (or bytes across) to the one in this table:

Hex Code

```
8E,1D,DF,   End address — offset
EC,83,
ED,88,20    Bytes across screen or offset
8C,06,20    Start address and offset
```

Try experimenting with the offset using different numbers. See if you can find the numbers which scroll left or right one byte at a time and don't forget to adjust other addresses.

Scroll left or right one bit at a time (using two colour modes).

```
5F
8E,1D,FF    or End addresses
1F,9A,
69,82,
1F,A9,
8C,06,00    Adjusting this and end
            address allow partial scrolls.
2F,FS
39
```

Scroll left

Scroll Right

```
JF,
8E,06,00    Start addresses
1F,9A,
66,80,
1F,A9,
8C,1D,FF    or End address
25,F5,
39
```

Scroll left and right in four colour modes

```
5F,8E,06,00    or Start Address
A6,84,46,56,46,56,A7,80,A6,84.59,46,59,
46,59, A7,80,A6,84,56,46,56,46,56,46,56
A7,80,8C,1D,00   End Address
23,E9,39
```

Scroll right

The next program is a scroll left for four colour modes:

```
5F,8E,1D,00   End Address
A6,1F,49,59,49,59,A7,82,A6,1F,56,49,56,
49,56,A7,82,A6,1F,59,49,59,49,59,A7,82,
8C,07,00   Start Address
24,E9,39
```

By calculated adjustments of the offset and screen addresses it is possible to set up scrolling "windows". The general addresses are given in Tables 1 and 2 for scrolling.

TABLE 1

MODE	2	3	4	5
Short form	65472,1	65475,1	65477,1	65473,1
Poke	65472	65472	65472	65472
	65474	65475	65474	65477
	65476	65476	65477	65477
X-resolution	64	64	96	192
Y-resolution	64	64	64	64
Number of bytes per character	1	4	6	12
Width of screen (bytes)	32	32	32	32
Start address	1024	1024	1024	1024
Finish address	1536	3072	4096	7168
Number of colours	2	8	8	8
Character height	32	128	192	384

TABLE 2

PMODE	0	1	2	3	14
Start address	1536	1536	1536	1536	1536
Finish address	3071	4607	4607	7679	7679
Colours	2	4	2	4	2
Resolution	128×96	128×96	192×128	192×128	256×192
Bytes across screen	16	32	24	48	32

Note that everything in decimal uses ?hex$(x) to convert to hex. Simply using and POKEing as indicated in the short form takes you from test mode to the mode required.

Try different addresses and codes but be careful about POKEing in the Basic area. This program illustrates how you can get text into those areas by POKEing random characters onto the screen.

```
10 POKE 65472,1 : POKE 65474,1 :
      POKE 65477,1
20 Y=RND(32)  :  X=RND(16)  :
      CH=RND(120) : REM SET UP
      CHARACTERS
40 FOR T=0 TO 5 : REM LOOP
      NUMBER OF BYTES TO CHAR-
      ACTERS TIMES
50 POKE 1024+X*192+Y+32*T,CH
60 NEXT:GOTO 30
```

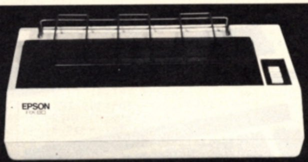
It sets up Mode 3 and to get a character you need to know how many bytes there are to a character — shown in table one. You then POKE the character code value to the screen in consecutive rows (i.e. add the number of bytes across the screen). The character height is 192 and you multiply it by x co-ordinately. You then add the Y value. CH is the character code — try experimenting with different modes.

The Dragon's graphics are fairly sophisticated at the price. The screen is controlled by a Motorola 6847 video display generator. It can be controlled by changing the locations between 65472 and 65477. By doing this, some new and spectacular modes can be achieved (with 192 by 64 resolution), including eight colours and a character mode. Table one gives all the information needed for changing modes.

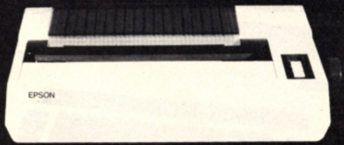
The start address is where the screen starts, at the top left-hand corner. The POKE gives all the addresses that should be POKEd with 1 to change modes.

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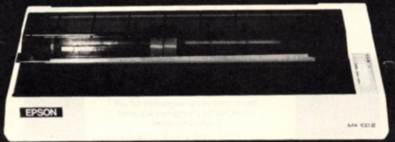
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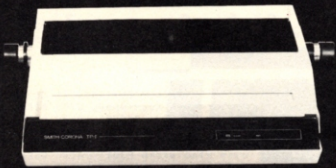


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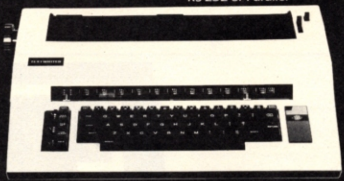


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Star Dreams come to the aid of the ZX programmer (Ted Ball) with a toolkit package.

Spectrum extras

ZX Tool Kit from Star Dreams is a machine code program that provides you with extra facilities for editing and debugging Basic programs on the ZX Spectrum.

Features

The functions included in ZX Toolkit are:
Block Move moves a block of Basic lines from one part of the program to another.
Case Change changes letters from upper case to lower case, lower case to upper case, or both.
Block Delete deletes a block of Basic lines.
Hex Dump displays contents of memory in hexadecimal.
Search and Replace replaces all occurrences of one string by another string.
Rem Kill deletes all Rem statements from a specified line onwards.
Line Merge merges a specified line with the following line.
Memory Map Displays the amount of memory used by the program, variables, etc.
Renumber renumbers a block of Basic lines.
String Search displays the line numbers where a specified string is found.
Trace (48K version only) displays the line and statement number being executed as a program runs.
Variables Dump displays variable names and values.

Presentation

The probram comes on an ordinary C12 cassette with the program name stamped on the label, the 16K version on one side and the 48K version on the other.

The instructions are printed on a slip of paper, with a separate errata slip correcting the instructions for the **Case Change** function. Although the instructions are brief they are clear, but there is one omission — the string search instruction.

In use

Stars Dreams has taken some trouble to ensure that the Tool Kit is easy to use. After the program has loaded you are left with the machine code at the top of memory and one line of Basic consisting of a number of DEF FN statements. You can type in or merge your Basic program from tape and then use the Tool Kit functions with RANDOMISE FN statements. For example, to delete lines 100 to 490 you type in RANDOMISE FN d(100,490). This makes the Star Dreams Tool Kit much easier to use than many programs of this type where you have to give a command of the form RANDOMISE USR address and memorise or look up five-digit addresses for each function.

The ZX Tool Kit is also very fast in operation. Most functions operate almost instantaneously, and the Renumber took



80 seconds on the 340 line program on which I tested it, which is not excessive for a program of that size.

The variables dump identifies the variables as simple variables, strings, FOR — NEXT loops, arrays, etc. It tells you the values of simple variables, the dimensions of arrays, and the lengths of strings. The information for FOR — NEXT loops can be confusing. You will get something like:

```
For — Next loop: FOR I = 11
                 TO 10
                 STEP 1
                 LINE 100: 1
```

where you have written 1000 FOR I = 1 TO 10. What has happened is that the variables dump has taken the current value of the loop variable (which is 1 more than the limit because the loop has been run and terminated) instead of the initial value you would expect in the format that is displayed.

The trace displays the line and statement number being executed in the top right hand corner of the screen. Although the trace slows the program slightly it still runs so fast that you cannot read the trace information. The Tool Kit really needs an extra feature in the trace so that you could either "single step" the program or get the trace information sent to the ZX Printer.

Some of the functions allow you to print your output on the upper or lower part of the screen, or on the ZX printer.

Reliability

Although the program works well in most cases and gives sensible error messages for most invalid commands, there are some bugs.

There are two problems with the block move. After you have moved a block of lines the line numbers in the program are not in order and the instructions tell you that you then have to renumber. However, the renumber will not work in this situation unless the start line number is less than the lowest line number in the block that has been moved. For example, if you have moved line 10 to between lines 100 and 110 and then try to renumber from lines 100 to 110 the line 10 in the middle will remain as line 10. In order to get the line 10 in this position renumbered the renumbering would have to start with a line number less than 10.

The other bug in the block move is that if you try to move a block of lines to a position inside itself, either some of the lines will become corrupted or the whole program will disappear.

Another bug in the renumber is that it does not check to see if any line numbers would become greater than 9999 after renumbering, and such line numbers become garbage both at the beginning of their line and within other program lines.

The last bug I found was in the trace command. The arguments required to the function are 0 for trace off and 1 for trace on, and giving any other number causes the computer to crash completely.

Verdict

The Tool Kit has several useful features, and even with the bugs you should have little trouble with it if you are careful. However, Star Dreams ought to amend the bugs, which need only a little extra error checking on the input.

RATING	
Features	■■■■
Documentation	■■■
Performance	■■■■
Useability	■■■
Reliability	■■
Overall Value	■■■

Name ZX Tool Kit **Application** Basic programming aid **System** ZX Spectrum, 16K or 48K **Price** £000 **Publisher** Star Dreams, 17 Barn Close, Seaford, Sussex **Format** Cassette **Language** Machine code.

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Jack Cohen checks a package for small businesses that will cope with all your payroll problems

Pet payroll bonus!

Small businesses needing a payroll system that also handles statutory sick pay legislation will probably find themselves looking at systems like Bonus! Designed for up to 25 employees, Bonus! runs on either a Commodore 8032 or 8096, and uses a wide range of printers from Commodore and from other manufacturers such as NEC and Qume.

I tested Bonus! on an 8032 with 8050 disk drive and an 8023P printer. It comes from Intex Datalog, which has been in the payroll business for some years and previously brought out Micropay 200.

Features

Bonus! is protected by both a security key and two passwords — both changeable. The first password is for the normal user, but if you need extra protection for particularly sensitive data, the second password may by used as well.

There is a configuration program to let you tailor the system to fit your needs: type of printer, number of overtime rates, how holiday pay is calculated, company bank account details, piecework rates and so forth. You can set up to 11 overtime rates, but no more than five for any one employee. You can also specify up to 20 additions or deductions to be made before or after tax — again, no more than ten per individual. And when you have finished configuring the system, you can print out the parameters you have chosen.

Bonus! caters for all tax codes and checks them each time you input a new employee. It will handle all National Insurance rates — standard and reduced rates for contracted and non-contracted staff, and employer contributions.

You can make comprehensive changes of tax codes when, say, there are budget changes. You can pay employees by cash, cheque or giro, and if you wish, you can prepare full lists for your bank. You can pay them weekly, two-weekly, four-weekly, monthly, or even eight-weekly if you prefer, and you can carry out a weekly, monthly or combined payroll run. The last of these options lets you make payments to all weekly, monthly, and those multi-weekly staff whose payment falls due that week. You may also choose to pay all employees for whom payment is due, or a range, or just one employee!

There is a standard week facility, using the data set up in the 'Input new employee' section. The Employee Diary is a permanent record of each staff member's attendance, sickness and absence throughout the year.

There is also a comprehensive SS module, but I was surprised to see that the manual warns you to treat the results with caution, since this is a new field. It is not yet fully integrated with the main payroll modules, but an update is due soon.

Anyone currently using Intex's Micropay-200 will be able to upgrade to Bonus! with the utility program included to make the transfer easier.

Presentation

The users manual is large, but I found the presentation clear, and though this is a complex subject, it was easy to follow. A contact number with a 24-hour answering service is given, as well as a telex number, to let users get help, advice and information.

In use

Getting started with this system should be no problem, providing you follow the user manual carefully with help from your company accountant. After the title screen, you are asked to enter your password — only a row of xs will be displayed on the screen, so onlookers cannot easily see what the password is. The wrong password will reset the computer, while the right one will obtain the message, 'Enter Date'. This date is fully validated once entered — vital, since the tax week or month number is calculated from it.

Our illustration shows the options available from the main menu. The first time you run the system, you will want to pick option 20, to configure by inputting all the once-off information such as type of printer or number of overtime rates.

You get a screen filled with display boxes — the first of them being for your company name and address, with up to 30 characters per line for five lines. It's followed by boxes for your bank's details, ready for giro payments, and a box to hold overtime rates.

The input to your bank's sort code box is not validated properly, and allows incorrect format of sort codes with the '+' and '.' operators. Further, it doesn't allow you to use the 'T' suffix used by banks for temporary addresses.

The rates of pay box allows you to enter overtime rates as percentages — 1.25, 2.0 etc, while piecework rates are entered as pounds per piece. Additions and deductions are set up in the form of an identifying number, title, and code — where each title may be before or after tax, an addition or deduction, and a value or percentage.

You need to choose the order of items in this list carefully, since they interact with each other. Percentages before tax are calculated as a percentage of gross pay with overtime after additions and deductions *before* it in the list. And a similar effect holds for percentages after tax, which are worked out from net pay after adjustments *before* it in the list. The manual doesn't put enough stress on this point.

Lastly, you can choose from a list of optional facilities — pay rounding, changeable passwords, cash analysis to produce a list of coin and note denominations needed from the bank and holiday pay handling.

For holiday pay, you have the choice between holiday accrual and holiday hours, and here there is a problem. With the hours method, you specify the number of hours to be paid during the year. But if you choose the accrual method, holiday pay is accrued as a percentage of gross pay for normal time working; overtime and bonuses do not qualify.

Since a number of Wages Councils fix rates of accrued holiday pay as a percentage of total earnings, *including* overtime and so forth, this will be incorrect in many cases.

Be warned when using the configuration program that pressing ESC or shifted RVS at any point during its run will lose all the entries you have made so far, and return you to the main menu.

Your next step is to enter details of your

MAIN MENU OPTIONS

1 Input New Employee	**9 Sort Employees**	**17 Reset Tax/NI Calculations**
2 Edit Existing Employee	**10 Status Report**	**18 Change System Date**
3 Delete Employee	**11 Utility Menu**	**19 Copy Data Disk**
4 Budget Amendments	**12 Payroll Run**	**20 Configure System Disks**
5 Annual Restart	**13 Print Payslips**	**21 Alter Password**
6 Monthly Summary	**14 Print Payslip Summaries**	**22 Enter SSP Monitor**
7 Year End Summary	**15 Print Bank Giros**	**23 End Program**
8 List Employees	**16 Print Cheques**	

Bonus! list. The 23 options available in the main menu allow full flexibility in configurating the system to your needs, and offer a wide range of facilities.

employees. I found that the program calculates payment as if it were for the period from April 6 unless you are careful to enter the tax week and month for the first payment, and so avoid NI being wrong. There's a quick-reference section in the manual to help you with the entries to be made in this section, and I found it very useful.

When you've finished with the employee input option, the next menu will allow you to edit employee details, input another employee, delete or return to the main menu.

Once back at the main menu, option 10 will give a status report on the number of employees on file, number of vacant records available, highest employee number, and week and month numbers of last pay run. The number of weekly and of monthly paid staff are also given, along with the number of staff already deleted and due to be deleted from the file, and the percentage of disk utilisation.

If there is a mistake in a payroll run, option 17 from the main menu will let you put it right, but only for the immediate past period. You can rectify errors for all your staff, or a range, or just one. But unfortunately, statutory sick pay for the eighth week of gross pay must then be manually calculated as a result of your correction.

Payroll run: Option 12 from the main menu takes you into a payroll run, which may pay weekly, monthly or combined staff. Payslips will be printed afterwards unless you choose to defer printing, and the screen shows which employee number is being printed along with a bar chart for the percentage of printing completed. You can also print payslip summaries and coin/note analyses, together with bank giro summaries and cheque lists.

SSP module: To operate SSP, you have to select option 22 from the main menu after each batch of new employees has been entered.

Entering an employee's number retrieves data from the Bonus! employee file to fill the screen, which is formatted as an SSP record card. You can then specify qualifying days as necessary, and either the same pattern or a different one for other weeks. If you are adding existing employees from another payroll system to your SSP records, days of SSP already paid can be entered and up to eight weeks of previous gross pay.

Before making a payroll run, you need to use the employees' diary option. Enter any sick days into the diary, and SSP due will then be calculated. Processing the report puts the amount of SSP payable into the employee's file, ready for the next payroll run. But when running the payroll program, you must pick a non-standard run. Otherwise, if SSP is not deducted manually from the employee's normal salary, both will be paid!

Reliability

Data entered to the system is validated fairly well, but power failures will mean that any data not already saved will be lost. In practice that will not be disastrous, since each employee is dealt with separately.

I managed to crash the system by switching off the printer at different points, and at one point the program broke into the monitor. This could happen with a blown fuse on the printer. I also found that an accidental touch on the ESCAPE key at various points could force a restart.

Verdict

A competent payroll package, though let down slightly by rather slow access times because of the relative record system Intex has chosen to use. The documentation is good and helpful, and all the features you would expect to find are there.

RATING	
Features	■■■■■
Documentation	■■■■■
Performance	■■■■
User interface	■■■■■
Reliability	■■■■
Overall value	■■■■

Name Bonus! **Application** Payroll system **System** CBM 8032/8096, various printers **Price** £400 **Publisher** Intex Datalog, Eaglescliffe Industrial Estate, Eaglescliffe, Stockton-on-Tees, Cleveland (0642) 781193 **Format** Disk **Outlets** Commodore dealers, mail order

Walter Knight monitors the inner most activities of his Newbrain . . .

NewBrain-scanning

The Monitor program, by E.J. Kemmett, is from the Watkiss stable. The idea is to let you rummage around inside your Newbrain to find out what is there — or indeed, what might be missing.

Features

With this in mind, you can go to any address and find out what is there in hex and ASCII, enter new bytes at addresses of your choice, and transfer blocks of data from one address to another. A hex/decimal/octal/binary converter is built in, to help people like me who are still not skilled in thinking in sixteens, tens, eights and twos in quick succession.

The contents of any address or group of addresses can be listed to screen or printer in hex, decimal, or ASCII code equivalents, and data can be SAVEd and VERIFIED or LOADed from the program.



Presentation

The program came in indentical packing to the Brainzap assembler, clearly labelled Monitor, and accompanied by a single A4 sheet of thin green card, which was far from informative. When I first opened it to reveal its blank interior, I thought that perhaps the user guide had fallen out. But there is no user guide. The only information available is the printed list of commands available in response to the > prompt, which also appears on the third screen you get when you RUN the program.

I really do feel that more information could and should have been provided, particularly for a program intended to open up the Newbrain, whose owner's manual may win a prize for obscurity and unhelpfulness.

Getting started

'Monitor' loads easily, if slowly, and then RUN presents a screen announcing itself, a copyright message, and 'Press space bar to continue'. The next screen contains the same menu of single-key commands available, listed in the most peculiar order:

E Exit from monitor
Q List available commands (in other words, the screen you are looking at)
A Prompts with $. Enter hex address. Replies with hex data at address at ASCII character (if any).
F Fills $xxxx > $yyyy = with $zz
M Moves $xxxx > $yyyy : to start at $zzzz
S Saves to tape from $xxxx to $yyyy. With verify
L Loads from tape
D Hex/ASCII/decimal dump to screen address $xxxx > $yyyy
P Print screen to printer
V Set screen to 40/80 columns for hex/dec dump.
R Recorder remote release
C Hex/dec/oct/bin converter
G Go from address $xxxx.

The logical impulse, once you have understood what is on offer, is to enter the appropriate command (and perhaps Newline). However, first you have to obey the prompt 'Press spacebar to continue', and then, when the menu has disappeared, you have to remember what it was that you wanted and how you were supposed to get it.

In use

To be fair, the printed version of the menu is invaluable at this early stage. Once you become familiar with the program it can probably be dispensed with.

From this point on, the Monitor does exactly what it says it will do — and works fairly quickly. If you want, and have the patience for it, you can step from 0000h to FF00h with the A (presumably for Address) or D (ump) commands producing among other insights the experience of using the program to examine the way it is stored itself.

Any command can be input in response to the > prompt without having to return to the menu. The program's response to the "V" (set screen format) order makes it look as if it has been refused even though it will in fact be executed. There is a second "P" for Print order (to list the menu to the printer), which is offered, apparently at random, at the bottom of some screens of menu.

Reliability

In the nature of a monitor program, which offers you the chance to wander around the Newbrain operating system, crashes can be expected.

I managed, by inputting decimal instead of hex at the "Go from address $xxxx" prompt, to lock up the computer so badly that the only thing to do was switch off, re-load and start again. I was warned — 'Without a good understanding of machine code programing, it is possible to crash the system."

I felt that a short error-trap routine would not have added too much to the program's 200-odd lines, and would save users a possible ten-minute delay in re-loading and re-starting after a major crash.

Verdict

It's interesting and worth the money just to get inside the Newbrain, and the program and fast and flexible in use.

But the documentation is bad. I would have thought that the minimum requirement would be a short explanation of what each function was for and how and when to use it, and a warning of the pitfalls of playing around in the operating system. The 19 short lines of information (the printed copy of the menu) are a sorry let-down of a competently written program.

Used in conjunction with an assembler, this package would make a useful introduction to machine code on the Newbrain.

However, as more software for the machine becomes available Watkiss Computers may have to consider upgrading the Monitor or be left in the cold by better programs.

RATINGS	
Features	■■■■■
Documentation	■■
Performance	■■■■
Reliability	■■■
Overall value	■■■

Price £8.80 **Publisher** Watkiss Computers, 4 Ninnings Lane, Rabley Heath, Welwyn, Herts AL6 9TD, tel (0438) 812 439 **Format** Cassette **Other versions** None **Outlets** Mail order.

Tired of grey, lifeless listings? David Janda tests a printer that will put colour in your hard copy.

Seikosha's rainbow print

Until the arrival of the GP-700A, full-colour printers were the preserve of people with at least £1,000 to spend. The GP-700A can be claimed with justification to represent a price breakthrough because it is capable of full-colour text and graphic printing for the comparitively modest outlay of £425 plus VAT.

The question is, of course, whether this pricing indicates limitations in performance.

First impressions

A display panel on the right features three indicator lights and four push-buttons. The lights indicate 'Power', 'Paper-empty' and 'Copy' the buttons executive 'Stop', 'Line feed', 'Form feed', and 'Copy'.

The Copy button engages an optional copy board (estimated to cost £60-£70) which gives you a screen-dump (in colour of course). The test model didn't have one of these and graphic production involved addressing the dots — a real headache.

The noisy moving bits are covered by a transparent plastic panel. This is removable but is a very necessary element for it reduces the noise significantly. It has to: this is the loudest dot matrix printer I have ever encountered. It sounds like someone is using an electrical circular saw in the next room.

Feed methods are either tractor or friction-feed. It isn't necessary to remove the sprocket holders for friction feed as there is ample room. The cassete holds a length of continuous ribbon and four ink cartridges — yellow, magenta, cyan and black. Extra colours are available by mixing (overstriking) different primary colours under software control.

Setting up

This is simplicity itself. Although I thought I would have trouble removing/replacing the ink cassette all that was needed was to turn the central spindle on the cassette, press the release lever and lift gently — three seconds at most. Inserting the continuous paper was just as easy because the tractor holders slide smoothly across the friction bar — fine adjustment is no problem.

Paper thickness is catered for with eight head adjustment positions.

The only real grumble I have about the process of getting up and running is trying to access the dip switches inside the printer. Six screws have to be undone and the cover of the printer gently lifted off. The dip switches allow you to change the four European character sets. The Centronics interface is at the back of the printer.

Documentation

Yuk! It's clear that documentation was last on the list of priorities. The inexperienced user is in for a shock.

Everything starts off simply enough. 'This is a plug, this is a printer' and so on; but the description of the control codes is enough to boggle the brain. Although all the necessary information is there it's written for the person who is going to install the printer as part of a system.

All the control codes, dip switch settings and so on are included but necessary information such as recommended paper and maintenance advice is wholly lacking.

I can see GP 700A users jamming their dealers' switchboards.

To give programmers an idea of how things are done there is a sample program at the back of the manual. Again, this is fine for the programmer, but for the everyday owner confusion is a certain companion.

Features

Its biggest feature is the ability to print in seven colours. It will allow printing of any colour within the line or pixel. This means that a screen dump of, say, the BBC's mode 1 in colour is theoretically possible. With all the control codes necessary to undertake the exercise many users may find the copyboard an attractive option.

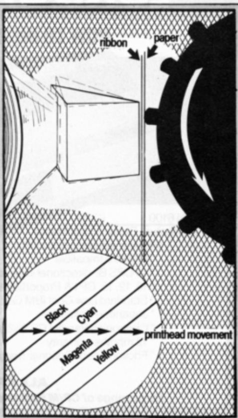
For ordinary characters, however, it is possible to change the colour quite easily.

LPRINT CHR$ (20)+CHR$(2)+ 'hello' will print 'hello' and subsequent characters in red. The colours can be changed by writing a different control code to the printer.

A word of warning — if you're interested in this printer it's essential that you make sure your applications programs are compatible. With some word processors, for instance, the control codes used to format the text may be interpreted by the printer differently. This is not the fault of the GP-700A; it's an inherent problem with printer buying.

Most of the operations of the printer can be controlled by software — writing codes to the printer. Line feed and carriage return can be sent individually if desired and there are three ways of setting line spacing.

It may be set to 1/8 or 1/16 of an inch or if you really want to be flexible, you can set the line feed to n/120 inches where 'n' is a number less than 99. Character spacing can be set to 10 or 13.3 characters per inch.



The reason the GP-700A is so noisy becomes apparent when you understand the way it gets those coloured dots onto paper. A conventional dot matrix printer knocks dots through a ribbon by striking selected elements from a row of pins.

The GP-700A gets its matrix effect by doing something very different. It runs a row of four vibrating wedge-shaped hammers down a ridged platten — represented in the diagram by the black object (the arrow indicates the direction of its spin).

Although it's represented here in 'cross-section', from its front it looks like an elongated gear wheel. It is positioned horizontally behind the paper and its ridges, which run length-wise down its circumference, are spaced a character-length apart.

As the platten spins the wedge-shaped hammer opposing it is vibrated against the ridges as they pass, punching columns of dots from the ribbon to the paper to build up the characters.

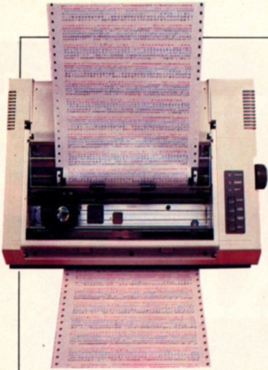
The clever thing about this technique is that it enables extra hammers to be lined up to share the platten.

The GP-700A runs a length of continuous ribbon at a 45 degree angle across the printhead mechanism. The ribbon is four-coloured and is topped up by replaceable ink cartridges. There is one hammer positioned over each colour band on the ribbon. As the printhead runs down the platten and across the paper it can overstrike colours or mix them in the one character matrix, starting with yellow, then magenta, cyan and black.

When this is mixed with the option of double width printing, you effectively have four different sized typefaces.

Page length can also be specified by either number of lines per page or by inches per page. You must be careful if you are to take the first option and then use large characters — you could end up in a mess.

Tabulation is not supported, but it is possible to specify the print position within a line by sending a three digit decimal number. When it is used in dot graphic mode, it is possible to specify the print position down to a single pixel.



One handy feature is the facility to repeat characters. By doing this it is possible to do long underlinings without having to enter a long string. It is possible to print individual dots in any of seven colours anywhere on the pages.

Normal text can be interspersed with graphics of your own design. The printer does not have any graphic character sets and it is left to you to send graphics data to the printer. To do this you can make whole characters one colour, or you can specify colours by RGB raster scan or hammer-head scan. This level of control means that the GP-700A must be one of the most flexible dot matrix graphic printers available.

If all this sounds a bit daunting, professional help is apparently on the way. way.

DRG, the 700A distributor, is busily drumming up third party software and hardware support. An Apple card for screen dumping to the printer is on the drawing board, expected to cost £65 to £75.

For BBC owners there is a possibility that Cloud Techniques Colour Palette box will also be supported with the necessary software to download its graphics. The company is also considering selling the necessary control program by itself.

The standard copy board from DRG is expected to cost £60 to £70.

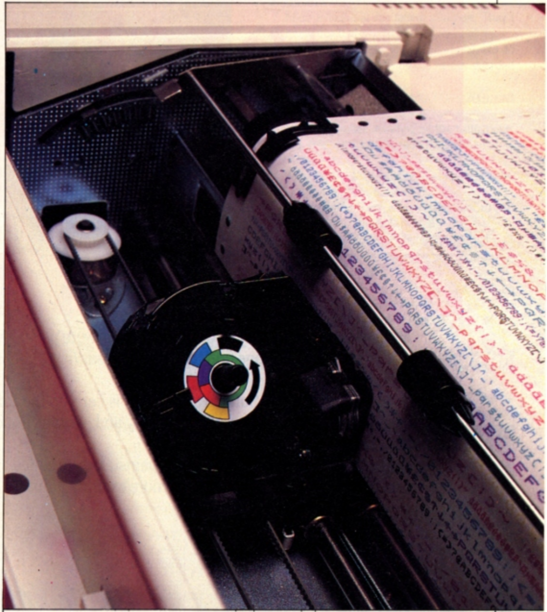
Up and running

Turning on the printer and holding down the line-feed sets off the self-test mode. All the characters are printed in glorious colour and at this stage the most disappointing aspect becomes clear. The black print on the test model was slightly blurred while all the other colours were fine.

I checked the paper, ribbon and ink cartridge but all was well. Setting the head adjustment did no good either so I can only put it down to the type of ribbon used.

I hope this problem is solved because although this printer's main feature is obviously colour, users are bound to want standard text output for the money.

The speed remained at a constant 50cps. Even when unusual combinations of colours are being executed the head



Colour close-up. The GP-700A's unusual print mechanism is a change from the usual wire-plan hammer. See box (left) for details of how this printer gets dots onto paper.

Ian McKinnell

requires only one pass to overstrike (see box opposite).

The friction feed was very good: even when using continuous paper it never wavered. Using single sheets meant that 1.5 inches of space was reserved at the top and bottom of the sheets and this is quite acceptable.

Two handy maintenance features: the paper debris picked up by the ridged platten was easily cleaned off. It's necessary to do this quite often. Also, when printing with different colours, parts of the ribbon tended to get smeared with another colour. One way to get round this is to put the printer into self-test mode without paper. This revolves the ribbon and gets the ink to the right places again.

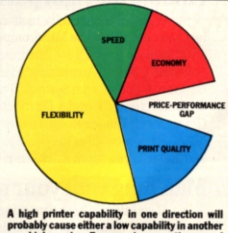
Verdict

The Seikosha GP-700A is a significant step forward in colour graphic printing and will be useful to people who need or want colour. It has many features that you wouldn't expect for the price.

Used with the planned graphics systems it should make a rewarding output device for the hobbyist, and provide a valuable tool for the designer.

To access its wonders, however, requires either additional hard or software, or patience and aptitude.

Item Seikosha GP-700A colour printer **Interface** Centronics parallel, RS232 (optional extra) **Speed** 50cps **Manufacturer** Seikosha **Price** £425 plus VAT **Supplier** C DRG (0934) 419914



A high printer capability in one direction will probably cause either a low capability in another or a higher price. Economy is a negative way of expressing price.

If a printer has lots of everything it will close the price/performance gap.

Exactly what been looking



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Each entry gives the package name, function, supplier, cost and also tells you which machines it will run on.

Matching with your machine

If you already have a machine, you'll want to know about compatibility. So we've included an index by machine make and model. And, just to make life easier still, we also cross refer machine type with operating system.



If ordinary cassettes are too slow, and disks too expensive, Barry Miles finds an alternative.

Faster storage on small budgets

Many micro users find data storage a major financial hurdle. Although computers continue to get cheaper, floppy disk drives steadfastly remain in the over £200 price bracket. Even the new generation of circa 3in floppy drives, is likely to hover for some time at least, in the £200 region, so you shouldn't expect too much from the shrinkage.

One alternative to a floppy disk drive is a purpose-built digital tape system. This can combine the mechanical simplicity of a tape drive with a data transfer rate approaching that of a disk drive.

But it still lacks speedy access to randomly positioned blocks of data on the media. Where a disk drive can shoot its head out to the right track and simply wait for the required sector to spin past, a tape system must be wound back and forth to the required place before data can be picked up.

Currah Computor (sic!) Systems of Hartlepool has come up with the Currah 220m — one solution for people whose micros use the 6502 processor. The Commodore 3000, 4000 and 8000 series are covered, as is the Vic 20, and no doubt the 64 version will emerge in due course. The Arfon memory expansion unit for the Vic 20 is also supported. Other computers eligible for the system include the OH10, UK101 and Aim 65.

If you're considering a sophisticated tape system as an alternative to disk drives, you'll want to know what you're losing in speed of access for the money you're saving on the more expensive disk systems.

A number of tape drives exist, but typically they tend not to offer random access facilities, particularly where older computers are concerned. For many such users, occasional random access facilities for data, and fast winding to locate programs, is all that is really required.

Getting started

The Vic version I tested was simple to connect. You just have to plug the board supplied into the memory expansion slot. The manual warns you to make sure that the Currah logo is uppermost, to ensure that the board is the right way up.

Connections for other machines are slightly more complicated, and buyers who are not used to plugging chips in and out will no doubt prefer to let their dealer do this. You must make sure that the space where the device will be located in memory is not already occupied, since it is memory-mapped. It therefore doesn't stop you using the existing ports and facilities. For Commodore and OH10 machines the device may be relocated to avoid possible conflicts.

No fewer than eight peeks and pokes are listed in the manual for each configuration — these test that you're hooked up correctly. Once you're satisfied you give a single command, which appears on the screen, and you are ready to go. You now have 21 extra Basic commands to enable you to control the 220m.

The manual gives a useful table which shows the trade offs between file size and tape capacity.

You have 35m of tape at your disposal, giving an absolute maximum of 50K data storage in 40 files of 1280 bytes per file, and





Ian McKinnell

a minimum of 30K data storage in 120 files of 256 bytes per file. All of these figures apply to one side of a digital mini-cassette, which is of approximately the same dimensions as the cassettes used in pocket note-takers.

In use

It is important to understand the way in which the system operates: access to files is random, but within a file, it is sequential. Thus you write variables to a file sequentially, and retrieve them in the same way. You can of course, retrieve variables and discard them until you arrive at the one that you want. This has its good and bad points.

Treating variables as fields within a file (record) they can be of varying length, which is convenient where strings are concerned, but if you want to find the 36th variable, *ie* field, you must read all the previous 35 before you get at it. This is all related to file size. If you have a file (record) which is 1280 bytes long, it could contain as many as 182 numerical variables (or fields). To get at the 182nd in each of the 40 files on a tape could take an unacceptable length of time.

The upshot of all this is that careful planning of file size is necessary if you are to get the maximum flexibility, speed of access and capacity. To this end, data files come in five sizes, rising in increments of 256 bytes. The manual gives helpful details of the amount of space taken up by numeric and string variables, which aids the planning process. A very small random access filing system could be designed, with a maximum of 120 records of 256 bytes, and with the filename used as the key.

For some applications this would be quite adequate, especially if rapid data retrieval were not high on the list of priorities, and if most of the data in a particular file would be wanted on each occasion when access took place.

With disk drives becoming a little cheaper, and 3in drives coming into the market, competition for this part of the market is becoming tougher, and a price cut from the present level of £139 may soon become essential if Currah's offering is to be successful.

The operating system has been carefully designed to enable errors to be trapped and handled successfully, including crass errors, such as leaving the cassette door open, and sending commands intended to create tape activity. An error flag can be peeked, and the result used to cause the program to jump to an error-handling subroutine.

One attractive touch is that if an error occurs in direct mode, a single letter is printed to the screen, 'N' indicating No cassette is present, 'E' End of tape encountered, and 'C' the cassette is write protected, the file has not been found in the directory, the End of File Marker has been encountered or overflowed, or there is a Read or Write Verification error.

In program mode the screen printing would be embarrassing, so you are able to peek a location, and by carrying out a logical AND, determine whether a particular type of error has occurred. This will enable robust code to be produced, resulting in user-friendly programs. The error flag is set only if the condition discovered is incorrect for the particular operation being carried out.

40▸

◄38

There are circumstances where this will not be sufficient. In a quest for increasingly user-friendly programs, we will possibly want to know the actual hardware status. For example, has the cassette door been opened? Is there a cassette in position, is it write protected? Has the end of tape been encountered? Again, Currah is to be congratulated on having thought of this, and having provided a hardware status flag — which can be read in the same way as the error flag — to provide this sort of information.

The manual contains some examples of using these flags to produce amusing and instructional messages. The very professional approach of the design team is indicated by the existence of commands to deal with read or write errors efficiently. In the first place, every read or write operation is automatically verified, and an additional verify command is available for vital data (or those of a nervous disposition). If an error is discovered, this can be detected, the tape rewound to the start of the block, (or file) and the instructions given to read the next file.

Processing of the data is speeded up by the use of substantial buffers to get the data in chunks — these can then be handled in Basic or machine code.

It is possible to discover, in program mode or direct mode, whether you have a program tape or a data tape installed in the machine. You can also find out the total number of data files which a tape will be able to hold, and the number of free spaces which exist. This figure is decreased as data is written to a hitherto empty file, and increased when the KF (Kill File) command is issued.

All this adds up to a rather intelligent tape unit. All commands are a single prefix, '@' or '!' followed by two letters only. These are mnemonics as far as possible. The '@FO' command formats the tape.

You can give the tape a name of up to 63 characters. This is a great help towards the ready indentification of tapes, and many disk users, including myself, wish that their disk operating systems offered similar luxury. It is by far the best practice to keep program tapes and data tapes separate, and the format command demands that you specify whether your tape is for programs or data. If it is for data, you must specify file length as well, in pages of 256 bytes. The manual warns that data corruption is the inevitable consequence of trying to mix data files and program files on the same tape.

The '@NF' command searches for the first free space on the tape and positions the tape ready to write to it. The command permits you to name the file, with up to 13 characters.

Typing '@OF' opens an existing file and reads its contents into a buffer, while '@CF' closes the file. It is important to realise that it is this command which actually writes the data onto your tape — until this command is given, it exists only in the buffer memory in the tape unit. Failing to close the file correctly will result in the directory management system's malfunctioning. However the '@KF' 'Kill File' command will set matters straight again.

CTOS — THE EXTENDED "BASIC" COMMANDS

Please note that for OHIO, UK101 and AIM65 the @ is replace by !

@ FO	"NAME" Only	Format Tape
@ DL		Directory Load
@ DS		Directory Save
@ PD		Print Directory
@ BS	"NAME" or A$	BASIC Save
@ BL	"NAME" or A$	BASIC Load
@ AP	"NAME" or A$	Append BASIC Program
@ NF	"NAME" or A$	New File
@ OF	"NAME" or A$	Open File
@ KF	"NAME" or A$	Kill File
@ CF		Close File
@ CD		Close File & Directory
@ RE	A or A$ etc.	Read Variable
@ PR	A or A$ etc.	Print Variable
@ FI		Initialise File Pointer
@ RW		Rewind
@ ER		Erase Tape
@ RB		Backspace
@ RN		Read Next Block
@ WN		Write Next Block
@ VE		Verify

It is important to use the '@CD' command after creating or updating files. This closes the last file used, and rewrites the directory onto tape, together with details of the locations. You can avoid having to do this by using '@DS' to save and verify the directory after closing the last file. '@DL' is the Directory Load command which you should invoke immediately after inserting a new cassette. It prints out a list of all unscratched files, as well as the cassette name.

The Basic program save command is '@BS', which is verified automatically. The directory is also saved and verified automatically. You load a Basic program with '@BL', which also carries out an error check. A program can be tacked onto the end of the existing one with '@AP', but it is the user's responsibility to ensure that the line numbers of the program onto which the incoming program is to be appended are all lower than any of the incoming lines. That is, it is *not* a 'Merge' operation. Variables are printed sequentially with '@PR'. Note that the sequential file is able to be a maximum of only 1280 bytes long. You will need to use several files consecutively if you need more space.

The opposite of '@PR' is '@RE', which allows reading of variables. Since the variables are stored in the cassette buffer in sequence, they can be given a different variable name from the one used when writing them to the file.

The file pointer is reset with '@FI', which enables data to be read from the beginning of that file. You erase the tape with '@ER', while '@RW' rewinds a tape and '@WN' writes the next block of data to tape.

You can POKE values into the start and end file pointers, and then dump the contents of any memory area onto tape. A similar command allows for these blocks to be loaded into the machine from tape. This permits loading and saving of machine code programs, and also allows screens of data to be loaded and saved.

Rewinding a tape completely from end to end takes over one and a half minutes, and this approximates to a worst case search time. In many cases the search time will be much less than this, and if nearby files are sought, three to four seconds for retrieval is common.

Verdict

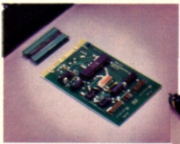
The machine works well, and performs as specified. Potential customers will look carefully at the trade-off between this and other methods of storage, as the Currah represents a substantial improvement on simple tape decks, but is much below the speed and capacity of floppy disks.

Some floppy disk units are becoming so cheap now that you would need to be very short of funds, and/or place a low value on your time, to go for this unit — especially if you expected to do a lot of random access file operations.

However, the easily remembered mnemonics, uses of files for individual records, which can be retrieved by name, and the variable length data fields will be of considerable attraction to new programmers, as will the ease of programming.

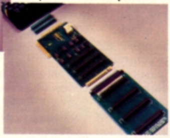
Whether you consider it a satisfactory alternative for a disk drive will depend on the depth of your pocket, and the price of the disk drive you would otherwise consider. Its limited capacity and slow speed make it suitable only for small simple random access applications, and I cannot help feeling that most users would grow out of it rather quickly, and trade-up.

Item Currah 220m mini digital cassette recorder **Machine** Pet 3000/4000/8000, Vic 20, Ohio/UK101, Aim65 **Manufacturer** Currah Computor Components, (0429) 72996 **Price** £200 inc VAT



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USP-I/O – general purpose parallel interface using the versatile Z80PIO chip. Use to connect to parallel printers, music synthesisers, plotters, D-to-A, and A-to-D, converters, relays, LED's.... It provides two 8 bit input or output ports with 4 handshake lines. Manual 30 pages.
USP-CENT – a kit for use with the USP-I/0 for Centronics compatible printers. Includes cable from USP-I/0 and LPRINT and LLIST drivers.

USP ZX Spectrum Expansion
'make it easy on yourself'

Future plans

We've got a further 5 boards at the design stage and plans for more after that. But our policy is not to announce until they are actually in production with stock on the shelves. Sorry!

U-Microcomputers Ltd., Winstanley Industrial Estate, Long Lane, Warrington, Cheshire, WA2 8PR.



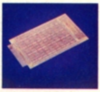
USP-ADAP



USP-BBP3



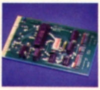
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RWP/Graphic Design

If you want a customised computer, the place to start is with a bare board. Stuart Cooke reports.

On Board a Rader

Over the last few months the number of microprocessors on the market has more than doubled. Most of these have been aimed at the home user, and offer facilities such as sound and colour. But the Rader 150 single computer is aimed at a completely different market — the original equipment manufacturer (OEM). That is, it is aimed at the manufacturer who wishes to use a ready made processor board in its own equipment.

On board the Rader 150 is a 4Mhz Z80A and 64K of memory. By using bank switching (moving blocks of 32K out of the memory map) the system ensures that none of this 64K is used for the video or RAM based character set (unlike many other popular systems).

Users of the CPU board will have to supply their own video monitor, keyboard, disk drives and power supply, as only the basic board is available.

The Rader 150 is designed with expansion in mind, and a number of option boards are either available or will shortly become available. Examples of these boards are 192K RAM boards, dual serial input/output ports, parallel input/output ports and a real-time clock board with battery backup.

Documentation

The documentation supplied consists of two photocopied manuals. But don't let the fact that they are not printed manuals put you off — the actual content is excellent. One manual is for the CPU board, and the other is for the on-board monitor ROM.

The fact that the Rader 150 is aimed at the development/manufacture industry and not at the consumer is obvious from the documentation.

The hardware manual takes each section of the board, from the clock generator and reset circuit to the on-board CRT controller, and discusses the operation of each section at chip level.

It is not for someone without a good knowledge of computing and electronics.

Part two of the manual describes the pin outs of the on-board connectors. All the connectors are there, from the DC power connector to the expansion bus. Also in this section is a description of the user selectable links used to select 5¼ or 8 in drives, for example.

Finally, at the end of this manual is a complete parts list for the PCB giving both the part and its location on the board.

Manual two describes the on-board monitor ROM. Again the fact that it is a photocopy shouldn't put you off.

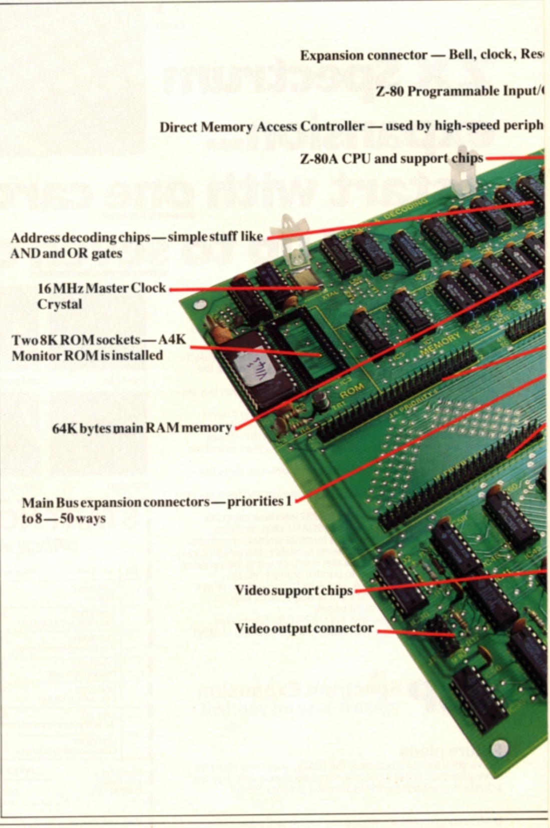
Contents range from a description of the software front panel offered by the system ROM to descriptions of the ROM routines that could be used within your own software.

Perhaps the only real moan about the documentation is that you are constantly referred to the technical data sheets produced by the manufacturers of each part being mentioned (for example the Western Digital floppy disk controller). It is necessary to have these data sheets, and so users of the system will have to get hold of copies.

Hardware

From an engineer's or technician's point of view, the design of the board is a work of art. It looks as though it would be a pleasure to work on.

Its physical dimensions are the same as a standard 8in disk drive, that is 8½in by



13¾in. The PCB is marked with the number of each component, as mentioned in the back of the hardware manual. A nice touch is the way that every hardware section has its own area on board — the floppy disk controller, for example, is on the bottom right. This is surrounded by a line of print, and the name of the section is also included within this border.

As previously mentioned the Rader 150 is based around the very popular Z80A running at a speed of 4Mhz. As well as the 64K of RAM on board there is provision for up to 16K of ROM.

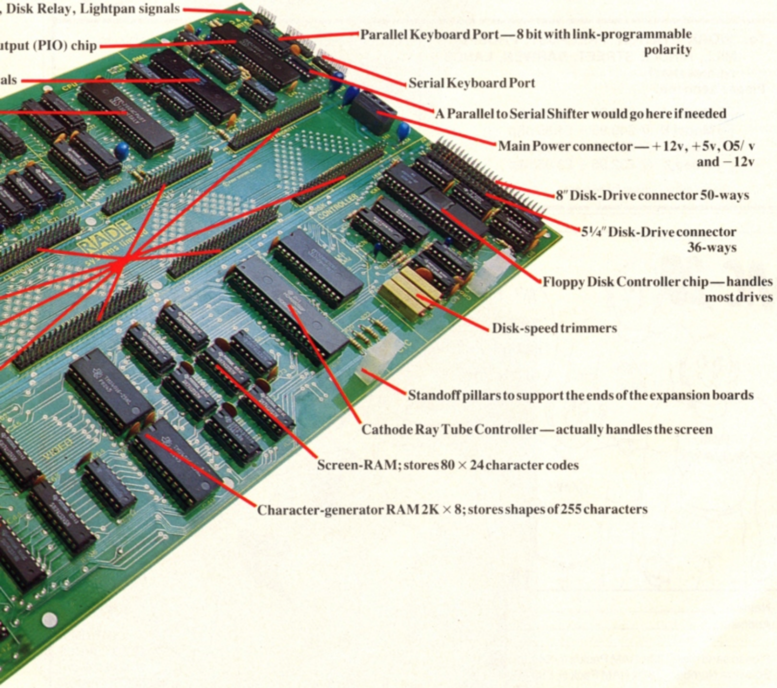
Two sockets are provided for ROMs, and normally the first of these will contain the 4K monitor (a 2532 ROM chip) which is fitted as standard. However the type of ROM used in both of these sockets is link-selectable, and up to 16K can be installed.

Video memory and character memory are both held in their own 4K of RAM, 2K for video and 2K for the character generator, which is not a part of the 64K user RAM. The fact that the Z80A can only address up to 64K is compensated for by bank switching pages (32K) of RAM in and out of memory map, therefore a virtually limitless amount of RAM or ROM can be accessed, and a 192K RAM board and an EPROM board are available, if the software running is designed to switch in and out the banks of 32K as required.

Floppy disk control is based around a Western Digital chip, the WD1797 FDC. This chip provides most of the control signals to drive a Shugart-compatible disk drive, so no problems interfacing disks should occur. Provision for either 5¼in or 8in drives and double or single sided, double or single density are provided for by the chip and are link selectable. For people requiring the power of a hard disk a separate option board will be required, and one is available from Rade.

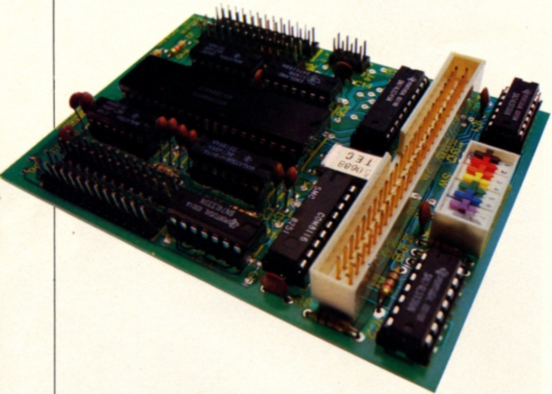
Provision for an ASCII encoded keyboard is included. This keyboard can be either parallel or serial, although a 74LS164 will need to be added in location IC37.

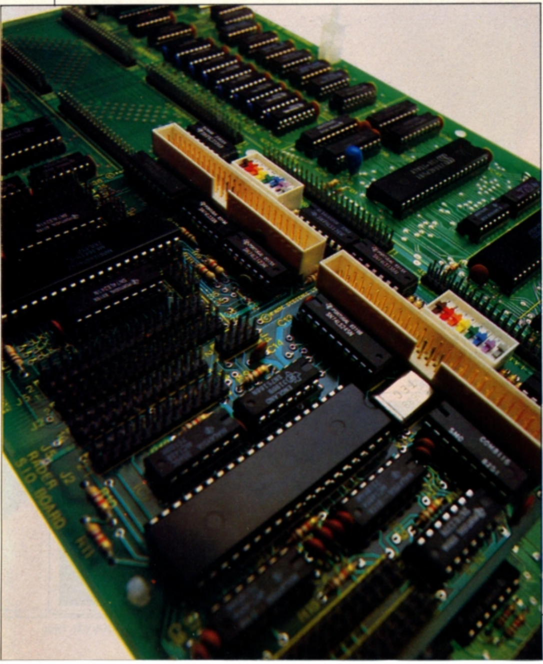
45►



RADE 150

◀43





The video output is standard composite, and gives an 80 column by 25 line display. The character set is RAM based, which means that the character set can be changed by the user allowing provision for character sets such as Arabic or German. In fact the monitor ROM allows the standard 8 × 8 character matrix to be changed to 8 × 10, so that a word-processing character set with true descenders can be defined.

Rade has designed its own bus architecture, and so only Rade's boards will be totally compatible with the system. There are eight 50-way connectors in the middle of the board, and these are the bus where the expansion boards will fit. All of the standard Z80 bus lines are available, so a little work modifying any boards from other manufacturers should ensure that most add-ons should work.

Each of the eight connectors has a different daisy chain interrupt priority (the priority being marked by each connector), allowing the Z80's interrupts to be fully supported.

Rade's unique bus design allows boards to be stacked on top of one another, so even though you only have eight connectors you are not limited to having only eight expansion boards. Most other systems, which have a limited number of bus connectors, don't allow this.

A lot of thought has gone into the design of this board, and the hardware should be sufficient for most purposes given the correct option boards.

Expansion

Having been designed as an expandable system Rader has a good selection of interface boards available. The standard board does not have provision for a printer, so Rade has developed both dual parallel and serial option boards — anyone wishing to use a printer will have to invest in either of these boards.

Rade's expansion boards can be addressed where required in the memory map, and so no conflict between devices should be encountered.

Other boards are a real-time clock with battery backup, an analog to digital converter and digital to analog converter boards. These will make the Rader 150 an ideal board for use within test or control equipment.

Also in the pipeline are a sprite graphic board and a sound generator board which will make the system a good choice for use within video games. There are more boards either planned or available, and Rade should be contacted for more details.

Documentation for these boards is again in the form of photocopies, the format being the same as that for the main board, describing the board from chip level.

In use

On power up the processor resets all of the peripheral chips on the board. This causes the monitor ROM chip to be executed from location 0. This chip sets up all of the peripheral devices (PIO, SIO etc.) and moves the character set from ROM into its

46▶

◄45 2K of RAM. Following this the system monitor is moved to the top of memory.

The second ROM socket is now checked to see if a ROM is installed in it. If there is not, the monitor will perform an auto boot command, loading the operating system from disk. The way in which the second ROM socket is checked will allow for provision of your own routines on board, for example you might install a Basic ROM in this socket.

The monitor ROM has a number of built-in monitor commands. To enter this front panel the escape key needs to be depressed six times. Having done this an asterisk will appear as a prompt. This monitor may be accessed at any time, even while a program is running.

Commands available while in the monitor are BOOT, DUMP, EDIT and GOTO. BOOT is simply entered as the letter b followed by return. This will then read the bootstrap program from the disk in drive A. DUMP is used to display sections of memory in hex.

The DUMP command has one parameter — the hexadecimal address from which the dump is to start. The format for this command is simply D xxxx, where xxxx is the hexadecimal address.

A block of data 256 bytes long will then be displayed, together with the ASCII character for each position. EDIT also has one parameter — the address which you wish to edit from the format is E xxxx. EDIT displays a dump memory from the position you specified.

You can now use the editing keys (CTRL k, j, h, l) to move around the block of memory and type in new hex values where required.

The GOTO command simply passes control to the specified address — the format is g xxxx.

Verdict

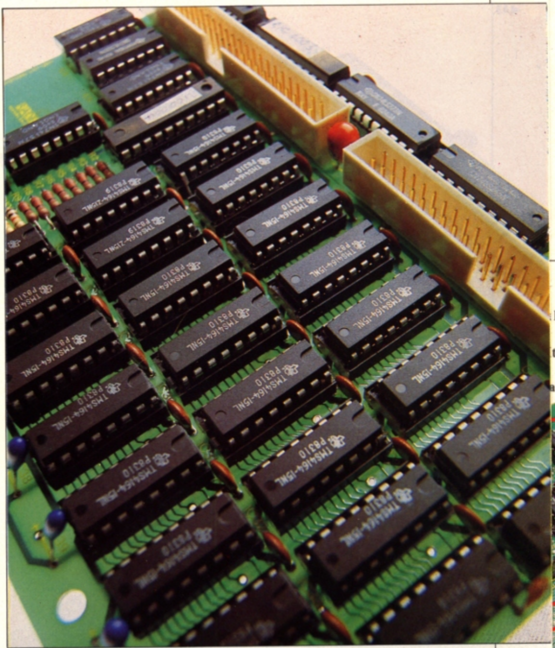
The Rader 150 single board computer is an excellent machine. Its generous expansion facilities make it an ideal system for use within industry either as a complete Z80-based system with drives, keyboard and monitor or as the basis of a piece of control equipment.

The design of the board makes it ideal as a processor board in an educational environment for introducing computer/electronic hardware.

Because the connectors are non-standard a few problems may be experienced in interfacing the board to existing equipment, but a soldering iron and a few new connectors on your keyboard should soon cure that.

It would have been nice to have seen an on-board printer socket, either parallel or serial, as the bare board would then be adequate for most people. As it stands an option board has to be purchased adding up to £57 to the price.

If you are looking for a Z80 CPU board to base either a microsystem around or to include within another piece of equipment, the Rader 150 may be the board that you have been looking for.



PRICE LIST		NETT	VAT	TOTAL
		£	£	£
Single Board Computer	R150	350.00	52.50	402.50
R 50 Single Board Computer	R50	185.00	27.75	212.75
Parrallel Option Board	P10	35.00	5.25	40.25
Serial Option Board	S10	50.00	7.50	57.50
Real Time Clock	RTC	45.00	6.75	51.75
Prototyping Board	PROT	16.75	2.50	19.25
192K Memory Expansion Board	RAM	250.00	37.50	287.50
64K Memory Expansion Board	RAM	140.00	21.00	161.00
Cassette Interface	CAS	65.00	9.75	74.75
Syncronous Serial Board	SYNC	50.00	7.50	57.50

Price	£402.50 (inc VAT)
Processor	Z-80A running at 4 MMz
RAM	64k plus 2K charactor generator RAM and 2k screen RAM
ROM	Up to 16K
Text screen	80 × 24
Graphics screen	None supplied, Sprite board TBA
Keyboard	User-supplied
Storage	User-supplied 5¼ or 8" Disks
Interfaces	DMA, 8 Bus-connectors, keyboad port, senial part video SYNC input
OS/Language	CP/M or user supplied
Distributor	RADE Systems, 01-451 4414
Software	Monitor and bootstrap

STAYING ALIVE

TI/99/4A

Carrot Chomping

Name Rabbit Trail **System** Texas Instruments TI/99/4A **Price** £29.95 **Publisher** Funware, Texas, UK distributor is Centresoft, (021) 520 7591 **Format** Cartridge **Outlets** Various TI dealers

Cute as rabbit pie, that's this Froggeresque-only-with-rabbits-and-weasels game for the somewhat software-starved Texas Instruments micro. Cute, but the review copy PCN sweated over had a will of its own.

Objectives

You are a little bunny rabbit, hopping along a pleasant green trail munching carrots.

There are weasels, hawks and various other naties all out to get you and squelch you flat. Nice! You're supposed to stuff yourself with the maximum possible number of carrots possible per square inch of your hide.

In play

As with most TI games, the graphics are pretty. Your little fuzzy friend is the softest shade of pink, with a fluffy white cottontail, and he hops along really quite convincingly.

The rabbitholes are no more than black squares, but the general effect is not bad.

The action, too, is fine as far as it goes. You get an apparently random stream of weasels charging down the racetrack as you hop up it, and your only chance if you meet one head-on is to either jump over it, or to turn cottontail and get out of there fast.

They tend to hunt in pairs, and since you can't jump over two unless they're running more or less neck and neck, your only strategy is to lurk between a pair of rabbitholes, and hope that one of them will go down the first hole so that you can jump over the second.

Rabbitholes are also your best bet if the occasional random hawk turns up to bother you.

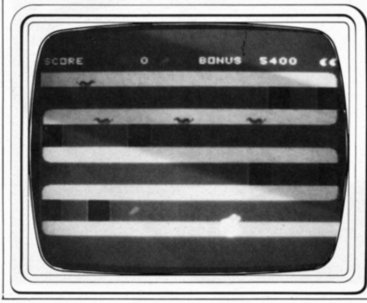
So far, so good. You get three lives, shown as fluffy tails at the side of the screen, so however cack-handed you are, it shouldn't be long before you get to the top of the first racetrack. But then I waited . . and waited . . and jumped over weasels . . and waited. Nowt happened. Just once, apparently by sheer chance, my bug-eyed hero landed up on a different screen positively dripping with carrots.

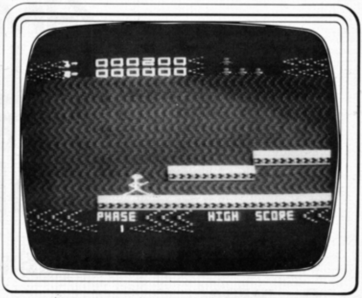
Verdict

Fairly fast and tricky enough too be worth playing if you get a copy that will go beyond the first screen. I'd say this could be quite a slick game.

Shirley Fawcett

RATING	
Lasting appeal	3
Playability	4
Use of machine	4
Value for money	2





Atari

Sacrificed at Dawn

Name Aztec Challenge **System** Atari 400/800/1200. or Vic 20 13K, or TI-99/4A, all with joystick **Price** £12.95 **Publisher** Cosmi, California, distributed in UK by Centresoft, (021) 520 7591 **Format** Cassette **Outlets** Various dealers

Now, for the three-computer household, comes the ultimate piece of software — The Tri-Compatible Game! But no, you don't actually *have* to play it on all three machines, Atari, Vic and II, for which there are versions packed onto the cassette. Just one will do, so I test-drove the Atari version.

Objectives

You are dumped in the capital of the Aztec Empire.

This is the year 1500 AD, and you are about to get sacrificed. Unless, that is, you can complete a seven-stage obstacle course by jumping over and under pillars, stalagmites, walls and fire pits, armed only with your joystick and four lives. Either one or two can play.

In play

You don't stand a chance. Not a snowflake's hope in the Towering Inferno of winning this obstacle race. But don't let that worry you, because whatever you were hoping, you don't actually get sacrificed in glorious Technicolor at all. Aw, shame! All that happens, each time you lose a life, is a promising rumble of thunder or volcanoes and the option to start again.

All you can do to save yourself is to jump, and keep right on jumping. Leap for your life over pillars of different heights without mangling your forehead against pillars hanging down from the ceiling. Skip lightly over flaming pits while dodging sets of stalactites and stalagmites. Bounce merrily through clouds of flaming batons.

To jump, use the fire button on your joystick, and by moving the joystick forward or backward you can control the height of the jump. Higher jumps earn you more points but take longer to complete, so you may come back down to impale yourself on a lurking pillar.

This is one game where it's worth preserving in hopes of getting an easier run next time.

Each time you complete a level, you get a bonus and move on to the next. And each time you *don't* complete one, but get spread around a boulder or fried in a firepit, you can start again at that level if you want.

Verdict

It isn't easy, it's slow at first but more than fast enough later on, and it does keep you on your toes because the obstacles can't be predicted. It does have smooth though not particularly sophisticated graphics. And it is a bit different from most other games. All in all, Aztec Challenge is a good product — of its type.

Shirley Fawcett

RATING	
Lasting appeal	3
Playability	1
Use of machine	3
Value for money	3

Steve McClure and Max Phillips delve into the depths of newly released BBC games

Beating the Beeb

Virgin Games, eager to expand its role in the computer games field, has just come out with three new games for BBC users.

All of the games are of a basically simple type. You won't be getting state-of-the-art stuff for your hard-earned shekels, but at least you will get some solid enjoyment.

BUGBOMB

In *Bugbomb*, your task is dead simple. All you've got to do is to stay out of the way of the nasty bugs that inhabit what's left of the earth's power grid in the far future.

You are Henry, a lone hero poised to save the world's power supply from the death-dealing bugs.

You are, also in extreme danger, since as soon as the game begins you have to move fast to avoid the killer insects.

You've very little time to lose in blowing away as many bugs as possible. That's because the bugs can wipe you out as soon as the game appears on screen. At a time when most players are just accustoming themselves to the screen display. So much for sportsmanlike behaviour, at least as far as the bugs are concerned.

Essentially the game is a simple version of Pacman, as you try to outwit your bug foes in a maze whose parameters don't seem quite big enough for both you and the bugs.

SPACE ADVENTURE



In Space Adventure, your objectives are much more complex than in the relatively simple Bugbomb. Here you must kill or avoid the androids guarding vital power packs and spaceship keys, without which your mission is a failure.

If you don't obtain enough power packs, your ability to shoot androids is severely limited, since you need lots of power to fuel your phasers and blasters. You must ensure you've enough residual power in your own life support system. Without it you're dead.

It requires much more than good hand-eye co-ordination, although this helps. You've got to be careful when to use your blasters and phasers and must also keep track of how many more android gunshots your suit can absorb. An android direct hit can zap you only if you're at the lowest point in your life support system, so it's best not to squander away your nine or so lives.

There's also an element of long term strategy in Space Adventure, since you must decide which of the android spaceship's three levels you next want to go to.

This game is imaginative and fun.

MISSILE BASE

Missile Base from Acornsoft. No free lives for guessing that this is Missile Command in splendid detail and colour.

It is supplied to the usual impeccable standards. The boxes are durable, good looking and virtually impregnable.

Missile Base is a faultless reproduction of the arcade original but I miss the trackball. If possible, use it with even the BBC joysticks. Keyboard control just isn't worth the trouble.

Beyond that, it's the same old game with all manner of things whose names I can't remember dropping relentlessly on your six cities. A graphical display of the number of remaining missiles on each base would be preferable — numbers are so hard to read when you're defending the World.

PAINTER

A&F software's Painter is a welcome burst of originality. The cassette may not be the most spectacular looking package you ever bought and neither is the game 100% new. But it stands out from the pack and it is both enjoyable and playable.

In Painter, you drive round a wire frame, painting in the boxes by traversing all four sides. You are pursued Pacman-style by a growing number of chasers and your only major defence is 'gaps'. You can break the lines for a few seconds in up to three places at once. Gaps stop your 'Painter' as well as the chasers — so beware.

Paint an entire frame before using up your three lives or the bonus timer and you get a bigger, better screen to start work on. Great fun — and a bit of a challenge.

Now the gripes. There's an instruction screen only for the duration of the LOAD. It goes away once the game's up. Pressing combinations of direction keys can accidentally insert a gap. There are times when a box looks complete but isn't. And having three different arrangements of direction keys doesn't make up for the lack of a joystick option.

But they're just sour gripes. Painter is definitely non-drip software.

LOGIC & CUNNING



Golem software has produced a seedy looking cassette labelled 'Games of logic and cunning! Could this be precious cult fodder for the thinkers? Unfortunately, GOLC demands only a little bit more thought from the users than the designers apparently put into writing it.

You get five games — Auction, Flip, Reverse, Telepathy and Hexa 15. In Auction, you bid against a friend or the computer to buy precious objects. You know the price it will go for in advance, but you're limited to bids between £1 and £10 greater than the last bid. Got it? It's a heavily disguised and slightly modified version of Nim.

Flip is based on a toy called 'Think-a-dot'. In the toy, you drop marbles down one of three holes and they fall through a matrix of eight flip-flops.

The all-electronic version is turned into a game by adding the challenge that you can flip all the flip-flops from all being one state to the other in six marbles. I can still do it but the big red mechanical version was cheaper, more fun and much more impressive.

I don't know what Reverse is. It gave a consistent 'Bad Mode' error. I suspect because of the disk interface fitted to the review BBC.

Next is Telepathy — a computer based joke. You're asked to stare at a flashing dot and then enter a number. INT(RND(1)etc. Later you get a silly message saying 'Congratulations' or 'Concentrate more' and so on.

Last and possibly least is Hexa15. Could it be hexapawn? No, it's a lucky-dip bag style sliding square puzzle.

ZANY KONG

Zany Kong, from Solar Soft, comes in a black and white cassette cover. It hardly leaps out from the shelf but it might fall on you. Inside, programmer Christopher Hyde reveals his true personality.

Not that anyone would want to make an ass of themselves by playing Donkey Kong these days. This version has all the relevant balls, hammers and so on but, apart from the almost unanswerable puzzle of how you pick up the first hammer, the game is a little tired.

Virgin Games, 61-63 Portobello Road, London W1 3DD 01-221 7535 — Bugbomb, £7.95; Space Adventure, £7.95. **Acornsoft,** 4a Market Hill, Cambridge CB2 3NJ 0223 316039 — Missile Base, £9.95. **H&H software,** 53 Holloway, Runcorn, Cheshire 09285 65566 — Billiards, £8.50. **Solor Soft,** 5 Westmorland Drive, Camberly, Surrey GU15 1EW 0276 66587 — Zany Kong, £6.50. **A&F Software,** 830 Hyde Road, Manchester M18 7JD 061 223 6206 — Painter, £8. **Golem Software,** 77 Qualitas, Bracknall, Berks RQ12 4QG 0344 50720 — Games of logic and cunning, £8 plus 50p p&p.

SPECTRUM ACTION

SPECTRUM

Beat the buzzards

Name Joust **System** Spectrum 16K **Price** £5.95 **Publisher** Softek, 01-674 6572 **Format** Cassette **Language** Machine code **Outlets** Mail order.

Things are so bad in Joust's world of the Shadow Lords that it's up to you, astride an Ostron (or ostrich) to defend the universe from the evil flying buzzards which are the bane of everything good and decent.

Objective

Once mounted on your Ostron your task is to destroy as many of the evil buzzards as possible by flying into them at an altitude higher than theirs. If you should be unfortunate enough to meet one of these avian menaces head on or below, you become so much buzzard bait.

Each buzzard has a different value according to colour. The dreaded Shadow Lords themselves add 150 points to your total.

You start out with five lives, a fair number considering the difficulty of the task before you. These are mean buzzards.

In play

I soon became aware of basic tactical manoeuvres essential to the success of any serious buzzard-beaters. These include using the various vertical barriers that divide up the field of play as barriers against the attacks of the buzzards.

It's also worth noting that these dastardly fellows have a way of suddenly doing tricky little dips and darts that leave the inexperienced Ostron flyer quite unprepared for the inevitable attack.

Each time you kill off a wave of buzzards you move on to a harder category of play in which ultimately the screen seems to be full of nothing but the evil green Shadow Lords themselves. These fellows are much harder to kill than their comparatively dull-witted cousins. And just to make matters worse your poor Ostron moves more slowly in each succeeding stage.

This is in fact one of the best things about Joust — no matter what level of skill you reach it will always get harder.

Sound effects for the game are adequate — there are no bells and whistles, just a convincing sort of squelch sound each time a buzzard finds his target and rather pleasing zap sound when you bring down one of the enemy.

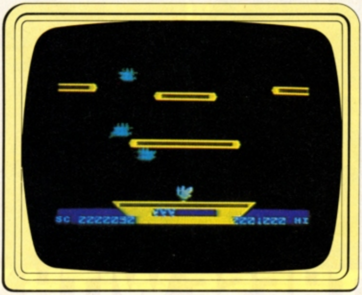
Scores are tabulated clearly in the bottom left hand corner of the screen and a high score table featuring the top ten scoring players of any given Joust session is shown at the end of each game.

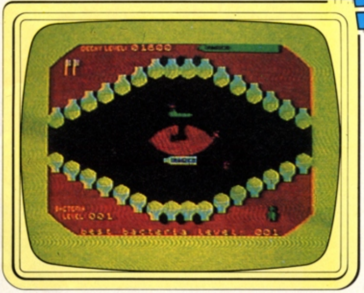
Verdict

Joust is a good, straightforward and challenging game that becomes more interesting the more you play.

Steve McLure

RATING
Lasting appeal
Playability
Use of machine
Overall value





SPECTRUM

Down in the mouth

Name Molar Maul **System** Spectrum 16K **Price** £5.50 **Publisher** Imagine Software, 051-2360407 **Format,** Cassette **Outlets** W H Smith, Menzies etc.

Open wide please. Our teeth are under constant attack from the indestructible, invincible oral bacteria Dentium Kamikazium — or DK to you and me. And it's a battle that can't be won. Don't feel too down in the mouth though, because constant brushing with toothpaste can considerably lessen the decaying effect, and prolong your tooth-life.

Objectives

Armed with three brushes and Imagico toothpaste, you scrub clean as many of the two rows of teeth as you can. In this way the damage of the DKs to each tooth is undone. The eventual irreparable and unsightly cavity is staved off for a while. It's a pretty unequal contest, especially as every fourth cavity is penalised with the loss of a brush. What's more, the dreadful DK blobs positively thrive on various sweets that melt in the mouth from time to time.

In play

The game opens with not exactly a pearly gape as the teeth start off uniformly yellow, represented top left as a decay level of 1600. The purple DK blobs have already begun their work on random teeth. This turns them first a shade of pale blue, then navy and lastly leaves a large hole and the decay level shoots up.

It is lowered on scrubbing a tooth white. Your brush appears above the tongue, the toothpaste tube below. You load up with a green squirt from the tube which appears only when you've run out again. To get your automatic delivery you must position the brush correctly. I found it difficult at first — and occasionally thereafter — as the required position is critical. Next, simply apply the brush to the tooth that most urgently needs treatment and scrub the decay away.

Once or twice the brush annoyingly refused to make tooth contact. And a squirt doesn't go far at all. But you can soon judge how many teeth can be rescued before needing new paste and it is all too easy to develop a ring of confidence about it.

With the upping of the bacteria level, the game gets faster and more crowded with blobs. Luckily the brush moves speedily to where you want it. The bacteria level is shown on the right, with the highest level yet achieved displayed permanantly across the bottom of the screen after the first game.

This holey war ends with a dirge, and no tombstones!

Verdict

Molar Maul is, initially, absorbing. But it's too easy to make progress up through the bacteria levels, while the action becomes repetitive. And that's the tooth of the matter.

Harriet Arnold

RATING
Lasting appeal
Playability
Use of machine
Value for money


TRY FIGHTING THESE WITH YO



Slot "Mutant Herd" into your VIC 20 computer and all of a sudden plutonium-crazed mutants will try to eat you alive.

Keep a look-out for falling boulders. They'll crush you to death at any second.

Avoid these successfully and all you have to do is save the world by destroying the heavily guarded Mutants eggs.

"Orc Attack" (on ATARI 400/800/1200) isn't exactly childsplay either.

Imagine yourself standing on the battlements of a castle, defending your Kingdom against an army of ferocious Orcs.

Watch out for the hail of deadly crossbow bolts. You've only got two lives to lose.

And you've only got a few rocks, a sword and boiling oil to defend yourself.

Lose your head and you'll be decapitated.

If your hands aren't sweating after that try our other action packed titles.

There's "Fourth Encounter" (on VIC 20), an exciting new game with 3 skill levels.

The challenging "River Rescue" and "Music Composer" are also on VIC 20.

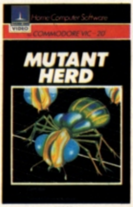
And to make the blood rush to your head the successful "Submarine Commander" is now available on VIC 20.

Or, if you've got ATARI 400/800/1200, there's the anxiety provoking "Jumbo Jet Pilot," as well as the best selling "Submarine Commander," "River Rescue" and "Kickback," all in the shops now.

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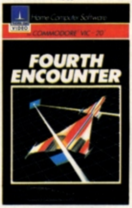
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VIC 20



ATARI 400/800/1200



VIC 20



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VIC 20



ATARI 400/800/1200



ATARI 400/800/1200

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*PROGRAMS FOR COMMODORE VIC 20 (Trademark of Commodore Electronics Ltd.).

BRAINPLAY

SPECTRUM

Trouble in store

Name Print Shop **System** Spectrum, 48K **Price** £6 **Publisher** Cases Computer Simulations, 14 Langton Way, London SE3 7TL (01) 858 0763 **Format** Cassette **Other versions** 16K ZX81, 16K Spectrum **Outlets** Various Sinclair dealers, Mail Order.

Aspiring entrepreneurs are advised to play Print Shop before setting up their own business — they may find the world of free enterprise is fraught with more perils than they realised.

Should you prove that you have what it takes to be a successful print shop owner, fame and fortune await you. However should you fail to turn a respectable profit after fifteen weeks of business, it's the bank that will be wanting to pay you a call.

Objectives

As owner and sole proprietor of your print shop it's up to you to decide on basic questions every business person faces — how many staff to hire, how much stock to purchase, what rates to set for customers, and so on.

While the instructions of this text game could be a mite daunting for those of us who don't fancy themselves future accountants, the basic economic commonsense of the program comes through loud and clear as soon as your decisions begin to have effects on your bank balance.

In play

Some video test games are strictly a bore, with about as much imagination as a laundry list. Happily, Print Shop is an exception.

The game is neatly and intelligently divided up into monthly financial statements, customer orders, inventory lists, and cost breakdowns.

It sounds dry and dull but it isn't. I and other players soon found ourselves totally preoccupied in trying to determine the best course for our fledglng business.

One thing that's fortunately missing from Print Shop is the element of chance. If you try to gouge a customer on an order, the bright red legend 'ORDER LOST' appears on screen, as sort of a moral lesson against greed.

But at the same time there's nothing quite like the thrill of realising a £100 profit on an order of wedding invitations that cost you £350 to produce.

Verdict

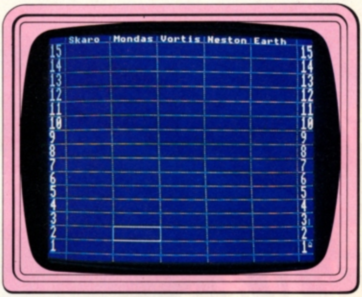
Print Shop is without doubt one of the best games of its kind. Well-paced and featuring modest yet effective sound, it makes up for what it lacks in spectacular graphics in clarity of thought and cleverness.

This is a computer game for people who like to think. You don't have to be a diehard capitalist to enjoy it.

Steve McClure

RATING
Lasting appeal
Playability
Use of machine
Overall value





BBC MODEL B

Time and motion

Name Time-Lords **System** BBC model B MOS 0.1 **Price** £7.95 **Publisher** Red Shift (01) 800 1333 **Language** Basic **Other versions** MOS 1.2 due next month **Outlets** Mail Order from Conflict, 12C Manor Rd, Stoke Newington, London N16.

An original strategy game on the BBC micro? It would be easier to buy a second processor from Acorn. But at £7.95, Time-Lords from the cheekily named Red Shift claims to be just that.

Objectives

Time-Lords is played on five planets throughout their history of 15 time zones. There are five races, mostly from Doctor Who not Alan Garner, each starting life on either Skaro, Mondas, Vortis, Neston or Stoke Newington.

You can have up to five players, all being Time-Lords hired to meddle with history and wars for the benefit of their race. The objective of the game is not clear but you could guess that you're supposed to help your race win.

First impressions

Time-Lords is a neatly labelled cassette with a bondage illustration for a cover. The instructions are printed upside down and written in an English-like language.

You get the impression that the game is hard but little else . . . a simple and effective way to ruin Time-Lords.

In play

This could have been a great game. You and your rivals are playing on a board that behaves like a spreadsheet. Meddle with a war and history changes.

Declining civilisations, civil war, time traps, time beacons and a host of other complexities offer a great potential.

But the program kills the game stone dead. The first problem is that the other players aren't supposed to see what you're doing. It prompts for people to be sent in and out of the room as necessary. It's so bad, it even works when there's only one player playing.

The program is lazy. It's not error protected, it's not consistent and it's very slow. The board, in one of the graphics modes, is tediously redrawn at each step before reverting back to the teletext screen.

The hieroglyphics that make up the playing pieces aren't clear on a TV or in the instructions. No one who bravely joined in was quite sure what they were doing.

Verdict

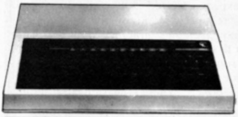
Time-Lords is a bored game. In theory, I suspect it could be tremendous fun . . . it's a fabulous idea. But Red Shift should nip back to Time Zone 1 and have a meddle with the program and documentation.

If you don't mind working quite hard to play a game, you might enjoy Time-Lords. Otherwise, the five player, five dimensional board game falls flat on its face.

Max Phillips

Rating
Lasting appeal
Playability
Use of the machine
Overall value

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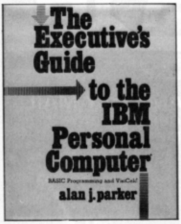
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PCN reviews the latest contenders for space on your bookshelf.



'The Executive's Gude to the IBM Personal Computer: Basic Programming and ViciCalc' by Alan J Parker, published by Prentice/Hall International at £33.95 (ring binder, 248 pages;

This is the Rolls-Royce of IBM PC guides, and it comes complete with its own garage. The book itself is a plastic-backed ring-binder and when you're not fondling it you can slide it into an accompanying cardboard case (in matching grey) so that the plastic doesn't get grubby.

Which brings us to subject matter. This is not easily approachable; there is an obstacle course of introductory chapters to overcome first.

'Before starting, please read this' is a promising title for a preface but it begs some questions, particularly since the next chapter is entitled 'Introduction'. Before starting what? Before starting to yawn and fidget and finger the executive toy absently, if the introduction is anything to go by, for here Eniac, the Industrial Revolution, and moon landings make wholly unnecessary cameo appearances.

With the homage to American achievement out of the way we finally get to the nitty-gritty. Reader participation becomes necessary, for the book comes with two diskettes which hold executive exercises.

The content becomes comprehensive, but will an executive really need to understand flowcharts or master data entry? The layout is excellent, and Professor Parker strikes the perfect balance, being lucid without being patronising. He also introduces some sly humour — the introduction to Visicalc includes the comment: 'The remainder of this page was intentionally left blank.'

For £33.95 you would expect something a cut above the rest. Whether this book is far enough in front of the field for it to be value for money will be something you'll have to decide for yourself — but it is worth a look for its presentation alone. **DG**

'The Dragon Programmer' by SM Gee, published by Granada at £5.95 (paperback, 160 pages)

Granada continues its efforts to monopolise the computer bookshelves at a steady pace and among the latest batch of titles is this offering for the Dragon user of some little experience.

Like all books of its kind it begins with explanations of what a computer is and what it does before moving on to the Basic language and the Dragon dialect.

There are ample explanations and examples which make the concepts easy to understand and should encourage even the rawest beginner to start coding.

Game players and those interested in more serious graphics applications are well catered for with three full chapters devoted to the Dragon's graphics abilities. The text in this section is a joy to read and there are screen shots so you know what is possible.

There is also a neat program that draws Lissajous figures.

Sound and games come under scrutiny with a simple space war program thrown in for good measure. **TJ**



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PCN ProgramCards

The first entry this week was submitted by Paul Wilson, of Bollington, near Macclesfield, Cheshire. Running on an Oric, Tumbler is an easy-to-learn game with four levels of difficulty.

The game itself requires you to pilot an out-of-control spacecraft with the cursor control keys so that you perform a safe landing.

As promised last week, you can finish off Jane Kennedy's Dragon 32 adventure, Wreck. These final two ProgramCards give you the remaining data statements to fulfil the many variations within the program.

Perhaps when you have entered and played Wreck, you might feel impelled to write your own adventure. If so send it to ProgramCards — you know it makes sense.

Attention Atari owners! How many times have you typed in your (or someone else's) program, saved it and then tried to run it and received a rather unfriendly error message?

When this happens you can only reach for the manual to decode the message.

Anthony Mead, of Bridgwater, Somerset, has the answer. His program is a useful routine to replace those unhelpful numbers with meaningful words.

Finally this week, one of our younger readers, 12-year-old Carl Blackett, of Blyth, Northumbria, has sent us a game for the Vic 20.

Speed Race is a relatively short program allowing you to control a car on a rolling road. A difficulty factor of 1 to 15 sets the width of the road (simple but effective).

Assuming you don't crash it lasts for five minutes but making the course longer is a simple adjustment.

Could you do this job?

PCN's present Programs Editor is off to pastures new. Now we want someone to replace him. If you have experience of a variety of machines, are familiar with more than one language and could follow, interpret and describe other people's programs we'd like to hear from you.

Send relevant details (CV essential) to: Cyndy Miles, Editor, *Personal Computer News*, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

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All disks and cassettes will be returned as soon as possible after evaluation or publication, at our expense.

PCN ProgramCards

Tumbler Card 1 of 3

8320T1/3

A hand-eye co-ordination game. NB: where '£' is printed, enter '#'.

Oric-1
Oric Basic
Application: Game
Author: Paul Wilson

```
20 RELEASE:HIMEM £9800
30 DIM MV(16)
40 SBASE=32:SHIP=SBASE+7:BASE=£B800+SBASE*8
50 KM=9:XM=239-8:YM=199-8:SP=40:EX=41
100 GOSUB 1000          INITIALISE
110 GOSUB 3000          'RULES
120 GOSUB 2000          'PLAY
400 CLS:TEXT:PAPER2:INK0
410 PRINT:PRINT:PRINT:PRINT"  Would you like another try?"CHR$(17)
420 PRINT"      (Y or N)"
430 GET A$:IF A$="Y" THEN GOTO 110
440 IF A$<>"N" THEN 430
900 CLS:PRINTCHR$(17)
910 END
999 REM ..... INITIALISATION
1000 FOR =0 TO KM
1010 :FOR I=0 TO 7
1020 :READ J: POKE BASE+K*8+I,J
1030 :NEXT
1040 NEXT
1050 FOR I=0 TO 15
1060 :READ MV(I)
1070 NEXT
1080 REM
1090 X1=0:Y1=0
1900 RETURN
1999 REM ..... PLAY LOOP
2000 X%=INT(RND(1)*XM):Y%=INT(RND(1)*99)
2010 CURSET X%,Y%,3:SHIP=INT(RND(1)*7)+32:CHAR SHIP,1,1
2020 N%=1:F%=0:J=INT(RND(1)*2)+8:M=0:X1=0:Y1=0
```

40-50	ASCII codes for ship orientation characters, and screen size
1000-1040	Overwrite characters 32 to 41 inclusive of alternative character set
1050-1070	Movement vector
2000-2010	Set random position and orientation for the ship

PCNProgramCards

Tumbler Card 2 of 3

8320T2/3

```
2030 REPEAT
2040 :B$=KEY$:IF B$<>"" THEN 2070
2050 :I=0:IF F%=1 THEN 2220
2054 :IF J=8 OR J=9 THEN 2110
2060 :GOTO 2220
2070 :I=J:J=ASC(B$)
2080 :IF J<8 OR J>11 THEN J=I:B$="":GOTO 2240
2090 :IF J>9 THEN 2160
2100 :F%=0:IF I+J=17 THEN F%=1:J=0:GOTO 2220
2110 :IF J=8 THEN SHIP=SHIP-1:GOTO 2130
2120 :SHIP=SHIP+1
2130 :IF SHIP<SBASE THEN SHIP=SBASE+7:GOTO 2230
2140 :IF SHIP>SBASE+7 THEN SHIP=SBASE
2150 :GOTO 2230
2160 :N%=N%+(J=10)-(J=11):M=1:IF N%=0 THEN M=0:X1=0:Y1=0
2170 :IF N%<-5 THEN N%=-5:GOTO 2190
2180 :IF N%>5 THEN N%=5
2190 :I1%=2*(SHIP-SBASE):J=I
2200 :IF N%<0 THEN I1%=(I1%+8) AND 15
2210 :X1=X1+M*MV(I1%):Y1=Y1+M*MV(I1%+1)
2220 :IF X1=0 AND Y1=0 THEN 2290
2230 :X%=X%+INT(ABS(N%)*X1):Y%=Y%+INT(ABS(N%)*Y1)
2240 :IF X%<0 THEN X%=XM:GOTO 2260
2250 :IF X%>XM THEN X%=0
2260 :IF Y%<0 THEN Y%=0
2262 :IF Y%<YP OR X%<PL OR X%>PR THEN 2270
2264 :GOSUB 5000:IF B$="Q" THEN GOSUB 4000:PULL:RETURN
2270 :IF Y%>YM THEN Y%=190:GOSUB 4000:PULL:RETURN
2280 :CHAR SP,1,0:CURSET X%,Y%,3:CHAR SHIP,1,1
2290 :Y1=Y1+GR
2500 UNTIL B$="Q"
2990 RETURN
2999 REM ..... RULES
3000 CLS:TEXT:PAPER2:INK0:PRINT:PRINT
3010 PRINT"            TUMBLER":PRINT:PRINT
3020 PRINT" Straighten out your tumbling"
3030 PRINT" spaceship and land on the pad"
3040 PRINT" at the bottom of the screen.":PRINT:PRINT
3050 PRINT" Use the Left and Right cursor keys"
3060 PRINT" to rotate the ship, and the Up and"
3070 PRINT" Down keys to move the ship forward"
3080 PRINT" or backward.":PRINT:PRINT
3150 PRINT" Select difficulty (1 to 4) ";
3160 D$=KEY$:I=RND(1):IF D$<"1" OR D$>"4" THEN 3160
```

2054	If ship is tumbling, and no command entered, keep it going
2080	Out of range command
2090	Test for movement not rotation (characters 10 and 11)
2100	Did last command stop the spin?
2110-2120	Spin the ship
2130-2140	Effectively modulus 7 operation on character number
2160	*N%* is the speed
2170-2180	. . . within limits
2190	Movement vector index
2210	X1 and Y1 are the position increments
2230	New position
2240-2260	Right, Left and Top border checks
2262	Is it not near landing pad
2264	Check for happy landing, crash if not
2270	Bottom border reached, so crash
2280	Erase old, then write new ship
2290	Effect of gravity

PCNProgramCards

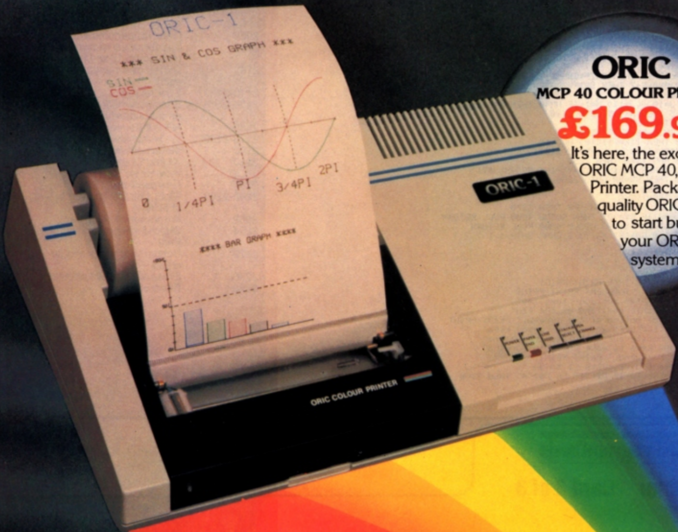
Tumbler Card 3 of 3

8320T3/3

```
3170 PRINTD$:D=VAL(D$):GR=.002*D*5:YD=4.1-D
3180 IF D=1 THEN GR=0:YD=4
3190 YP=YM-10:PL=INT(RND(1)*150)+20:PS=10+(D-1)*3:PR=PL+PS
3200 PRINT:PRINT:PRINT" Press any key to start."
3210 GET D$
3220 CLS:PAPER0:INK7:HIRES:PRINTCHR$(17)
3230 CURSET 0,198,3:DRAW 239,0,1
3240 CURSET PL,198,3:DRAW 0,YP-YM,1:DRAW PS,0,1:DRAW 0,YM-YP,1
3250 PL=PL-6:PR=PR+6
3990 RETURN
3999 REM ..... A CRASH
4000 CHAR SP,1,0
4005 CURSET X%,Y%,3:CHAR SP,1,0:CHAR EX,1,1:EXPLODE
4010 PAPER1:INK0:WAIT 10
4020 PAPER3:INK1:WAIT 20
4030 PAPER7:INK0:WAIT 30
4040 PAPER0:INK7
4050 WAIT 500
4990 RETURN
4999 REM ..... TEST FOR A HAPPY LANDING
5000 IF X%<PL+6 OR X%>PR-6 THEN Y%=190:GOTO 5070
5010 IF Y1>YD THEN Y%=YP:GOTO 5070
5020 IF SHIP<>SBASE THEN Y%=YP:GOTO 5070
5040 GOSUB 6000:POP:PULL:RETURN
5070 B$="Q"
5990 RETURN
5999 REM ..... HAPPY LANDING MESSAGE
6000 CHAR SP,1,0:CURSET X%,YP,3:CHAR SBASE,1,1:CURSET 12,24,3
6010 T$="CONGRATULATIONS, YOU DID IT"
6020 FOR I=1 TO LEN(T$)
6030 :CHAR ASC(MID$(T$,I,1)),0,1:CURMOV 6,0,3
6040 NEXT
6050 WAIT 500
6990 RETURN
32000 REM >>>CHARACTER DEFINITIONS
32010 DATA 0,12,12,45,63,45,33,0
32020 DATA 0,18,39,30,28,13,2,4
32030 DATA 0,60,8,31,31,8,60,0
32040 DATA 0,4,2,13,28,30,39,18
32050 DATA 0,33,45,63,45,12,12,0
32061 DATA 0,8,16,44,14,30,57,18
32070 DATA 0,15,4,62,62,4,15,0
32080 DATA 0,18,57,30,14,44,16,8
32090 DATA 63,63,63,63,63,63,63,63
32091 DATA 0,0,0,0,4,28,14,62
32100 DATA 0,-1,1,-1,1,0,1,1,0,1,-1,1,-1,0,-1,-1
```

3170-3180	Establish difficulty
3190	Pad position and size
3230-3250	Draw ground and launching pad
4000-4050	Crash sequence
5000	Not fully on landing pad
5010	Going too fast
5020	Upside down or something
5040	Good landing
32000-32091	Character definitions
32100	Movement vector

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Salamander Software

PCNProgramCards

Wreck Card 7 of 8

8320W7/8

Continued/Dragon/Dragon Basic/Jane Kennedy

```
2270 DATA,0,0,0,0
2280 DATA,0,0,0,0
2290 DATAYOU ARE IN THE CAPTAIN'S CABIN  AND HIS DESK IS STILL STANDING  IN THE
MIDDLE OF THE FLOOR.THEREARE WAYS FORWARD AND TO PORT,1,0,1,0
2300 DATAAT THE BOTTOM OF THE STAIRWAY.  YOU MAY PROCEED FORWARD OR AFT,1,1,2,0
2310 DATAYOU HAVE ENTERED THE OFFICERS'  MESS.A LARGE TABLE IS FIXED TO  THE FLO
OR.DOORS LEAD FORWARD OR AFT,1,1,0,0
2320 DATATHERE ARE BUNKS LINING EACH WALLAS THIS IS THE OFFICERS' SLEEP- ING QUA
RTERS.DOORS LEAD FORWARD AND AFT AND THERE IS A STAIRWAY DOWN,1,1,2,0
2330 DATAYOU HAVE ENTERED THE MUNITIONS  HOLD.THERE IS A GAPING HOLE IN  THE STA
RBOARD SIDE OF THE SHIP. YOU MAY ALSO PROCEED FORWARD OR AFT,1,1,0,1
2340 DATAWITH THE HALF BURIED TOOLS AND  PIECES OF TIMBER FLOATING ABOUT THIS IS
 OBVIOUSLY THE          CARPENTER'S SHOP.THERE ARE WAYS STARBOARD AND AFT,0,1,0
,1
2350 DATATHIS IS THE ROPE LOCKER.A DOOR  LEADS STARBOARD,0,0,0,1
2360 DATAYOU ARE NOW IN THE OPEN SEA OUT-SIDE THE WRECK.TO RE-ENTER GO   PORT,0,
0,1,0
2370 DATAYOU ARE IN THE SAIL LOCKER.THEREARE WAYS PORT AND FORWARD,1,0,1,0
2380 DATATHIS IS THE BRIG AND A SKELETON HANGS FROM THE SIDE OF THE SHIP.THERE A
RE WAYS AFT AND TO PORT,0,1,1,0
2390 DATAYOU HAVE ENTERED THE BOND STORE.CASKS ABOUND.,0,0,0,1
2400 DATAYOU HAVE LEFT THE WRECK AND ARE ON THE SEABED.PIECES OF THE     WRECKAG
E ARE SCATTERED AMID THE LOVELY CORAL.TO RE-ENTER THE    WRECK GO STARBOARD,0,0,
0,1
2410 DATATHIS IS THE TREASURE ROOM.,0,0,2,0
2420 DATAYOU ARE IN THE FOOD STORE.THERE ARE DOORS AFT PORT AND FORWARD,1,1,1,0
2430 DATAYOU HAVE ENTERED THE GALLEY.   TO PORT IS A GAPING HOLE. YOU   CAN GO
FORWARD OR AFT,1,1,1,0
2440 DATAIN THE CREWS' MESS AND THE TABLEHAS FALLEN TO ONE SIDE.A STAIR- WAY LEA
DS UP AND DOORS LEAD FOR-WARD AND AFT,1,1,2,0
2450 DATATHIS IS THE CREWS' QUARTERS WITHTHE REMAINS OF HAMMOCKS STILL   HANGING
 FROM THE BEAMS.YOU MAY  SWIM FORWARD OR AFT,1,1,0,02460 DATAYOU ARE IN A LARGE
CARGO HOLD   WITH CRATES IN VARIOUS             CONDITIONS SLEWING AROUND.DOORS LE
AD FORWARD AND AFT,1,1,0,0
2470 DATATHIS IS A SMALL CARGO HOLD.IT   IS DARK HERE.A PASSAGE LEADS AFT,0,1,0,
0
2480 RETURN
```

2270-2470	Second and final part of DATA statements used in 2150
2480	Return to main program at 50

PCNProgramCards

Wreck Card 8 of 8

8320W8/8

```
2490 CLS:PRINT"YOU ARE ON HOLIDAY ON A REMOTE","ISLAND IN THE WEST INDIES.YOU","
ARE FEELING BORED WHEN AN","UNKNOWN PERSON LEAVES A NOTE AT","YOUR HOTEL"
2500 PRINT"IT OFFERS A CHANCE OF BURIED"
2510 PRINT"TREASURE IF YOU MEET THE SENDER IN 'THE BARRACUDA' BAR"
2520 INPUT"PRESS   <ENTER>   TO START YOUR ADVENTURE";X$
2530 RETURN
2540 CLS4:PLAY"T50L4V3105BAGFEDC04BAGFEDC03BAGFEDC02BAGFEDC01BAGFEDL2C":PRINT@13
1,"YOU HAVE RUN OUT OF OXYGEN";:GOTO2570
2550 CLS4:PLAY"T50V31L405BAGFEDC04BAGFEDC03BAGFEDC02BAGFEDC01BAGFEDL2C":PRINT@67
,"IT'S A PITY YOU DIDN'T KILL";:PRINT@98,"THAT OCTOPUS-NOW HE'S GOT YOU";:GOTO25
70
2560 CLS4:PLAY"T50V31L405BAGFEDC04BAGFEDC03BAGFEDC02BAGFEDC01BAGFEDL2C":PRINT@13
6,"YOU DIE HORRIBLY";:GOTO2570
2570 PRINT@455,"ANOTHER GAME (Y/N)";
2580 I$=INKEY$:IFI$="" THEN2570
2590 IFI$="Y" THENRUN
2600 CLS:END
2610 CLS2
2620 FORX=0TO447:PRINT@X,CHR$(175);:NEXTX
2630 PRINT@352,A$+D$+B$;:PRINT@352,CHR$(191);:PRINT@369,C$;
2640 PRINT@388,D$+E$;
2650 PRINT@421,D$+F$;
2660 FORX=301TO365STEP32
2670 PRINT@X,D$;:NEXTX
2680 FORX=391TO403STEP2:PRINT@X,CHR$(189);:NEXTX:FORX=424TO434STEP2:PRINT@X,CHR$
(183);:NEXTX
2690 S=220
2700 FORX=18TO306STEP32:PRINT@X,CHR$(255);:SOUNDS,1:S=S-10:FORD=1TO150:NEXTD:PRI
NT@X,CHR$(175);:NEXTX
2710 PRINT@338,CHR$(255);:SOUNDS-10,1
2720 FORD=1TO200:NEXTD:GOTO140
```

2490-2530	Introduction routine
2540	Death sequence number 1
2550	Death sequence number 2
2560	Death sequence number 3
2570-2600	Prompt and response for another game
2610-2720	Routine performed when 'Dive' selected and oxygen carried. Underwater sequence.

PCN ProgramCards

Atari Errors Card 1 of 2

8320AE1/2

A very useful routine to generate sensible error messages during the running of a program. Once the program has been entered, save to cassette using 'List "C:" format. To reload use 'Enter "C:" so that merging with other programs can be effected

```
0 TRAP 30000
1 REM User program placed between lines 1 and 29999
29999 END:REM Prevents overrun of user program"
30000 REM Error Message Routine - written by A.P.MEAD
30010 GRAPHICS 0:PRINT
30020 PRINT"Error number ";PEEK(195);" in line ";256*PEEK(187)
+PEEK(186)
30030 PRINT :PRINT :PRINT
30040 LIST 256*PEEK(187)+PEEK(186)
30050 PRINT "↑↑↑↑↑":REM 5 cursor ups
30060 IF PEEK(195)>21 THEN 30280
30070 GOTO 30060+PEEK(195)*10
30080 PRINT "Memory insufficient":END
30090 PRINT "Value error":END
30100 PRINT "Too many variables":END
30110 PRINT "String length error":END
30120 PRINT "Out of data error":END
30130 PRINT "Number greater than 32767":END
30140 PRINT "Input statement error":END
30150 PRINT "Array or string DIM error":END
30160 PRINT "Argument Stack overflow":END
30170 PRINT "Floating Point over/underflow ":END
30180 PRINT "Line not found":END
30190 PRINT "No matching FOR statement":END
30200 PRINT "Line too long":END
30210 PRINT "GOSUB or FOR line deleted":END
30220 PRINT "RETURN error":END
30230 PRINT "Garbage error":END
30240 PRINT "Invalid string character":END
30250 PRINT "LOAD program too long":END
30260 PRINT "Device number >7 or =0":END
30270 PRINT "LOAD file error":END
```

Atari 400/800
Atari Basic

Application: Utility
Author: Anthony Mead

0	Calls message routine on occurrence of an error
1-29999	User program placed here
30000	Start of message routine
30010	Clears screen, places cursor
30020	Location 195 contains error number. Locations 186, 187 contain number of line where error was detected
30040	List offending line for editing editing
30050	'Cursor up' symbol obtained by pressing (ESC) then (CTRL)&(↑) together
30060	Jumps forward if error number is greater than 21
30070	Calculates correct message line and jumps there
30080-30270	Print relevant message for errors 2-21

PCN ProgramCards

Atari Errors Card 2 of 2

8320AE2/2

```
30280 IF PEEK(195)>147 THEN 30500
30290 GOTO 29020+PEEK(195)*10
30300 PRINT "BREAK abort":END
30310 PRINT "IOCB already open":END
30320 PRINT "Nonexistent device":END
30330 PRINT "IOCB Write Only error":END
30340 PRINT "Invalid command":END
30350 PRINT "Device or File not open":END
30360 PRINT "Bad IOCB number":END
30370 PRINT "IOCB Read Only error":END
30380 PRINT "End Of File reached":END
30390 PRINT "Truncated Record":END
30400 PRINT "Device timeout":END
30410 PRINT "Device NAK":END
30420 PRINT "Serial Bus framing error":END
30430 PRINT "Cursor out of range":END
30440 PRINT "Serial Bus data frame overrun":END
30450 PRINT "Serial Bus data frame checksum error":END
30460 PRINT "Device done error":END
30470 PRINT "Read after Write compare error":END
30480 PRINT "Function not implemented":END
30490 PRINT "Insufficient RAM":END
30500 GOTO 28910+PEEK(195)*10
30510 PRINT "Drive number error":END
30520 PRINT "Too many OPEN files":END
30530 PRINT "Disk full":END
30540 PRINT "Unrecoverable system data I/O error":END
30550 PRINT "File number mismatch":END
30560 PRINT "File name error":END
30570 PRINT "POINT data length error":END
30580 PRINT "File locked":END
30590 PRINT "Command invalid":END
30600 PRINT "Directory full":END
30610 PRINT "File not found":END
30620 PRINT "POINT invalid"
```

30280	Jumps forward if error number is greater than 147
30290	Calculates correct message line and jumps there
30300-30490	Print relevant message for errors 128-147
30500	Calculates correct message line and jumps there
30510-30620	Print relevant message for errors 160-171

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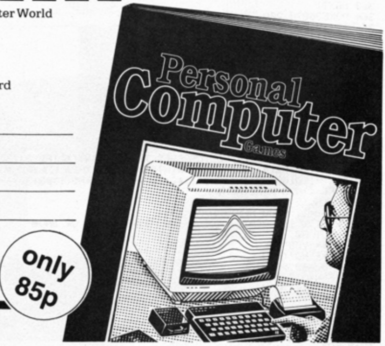
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PCNProgramCards

Speed Race — Card 1 of 2

8320SR1/2

A short but taxing racing game with varying levels of difficulty

Vic 20
Commodore Basic
Application: Game
Author: Carl Blackett

```
1 POKE36879,153:PRINT"▓▓▓▓ SPEED RACE 1983.     TRY TO AVOID THE   OBSTACL
ES"
2 PRINT"▓▓ USE ▓Q■ & ▓P■ TO            CONTROL YOUR CAR"
3 FOR I=1TO 3900
4 NEXT I
5 PRINT"▓▓▓ HOW WIDE DO YOU WANT THE TRACK(1-15)
6 INPUT W
7 IFW<1ORW>15THEN5
8 PRINT"TYPE ▓S■ TO START,OR ▓E■  TO END"
9 INPUTA$
10 IF A$="E"THEN 2000
11 IF A$="S"THEN 20
15 GOTO 8
20 LET S=0:LET M=200:LET W=INT(W/2):LET L=10:LET Y=W:LET R=W
100 LET D=INT(RND(0)*3-1)
110 IF L+D<0 OR L+D>20 THEN GOTO 100
120 LET L=L+D:LET Y=Y-D:LET R=R+D:LET N=L
160 GOSUB 1000
170 PRINT"▚";
180 LET N=Y
190 GOSUB 1000
200 PRINT"*";
210 LET N=R
220 GOSUB 1000
230 PRINT"▓"
240 GET I$
250 IF I$<>"Q"THEN GOTO 280
260 LET Y=Y-1:LET R=R+1
280 IF I$<>"P"THEN GOTO 310
290 LET Y=Y+1:LET R=R-1
310 IF Y<1 OR R<1 THEN GOTO 379
320 LET S=S+1
330 IF S<M THEN GOTO 100
340 PRINT"WELL DONE-YOU MADE IT "
350 PRINT"THROUGH SPEED RACE"
```

Lines	Description
1-2	Intro and instructions
3-4	Pause
5-7	Input difficulty factor
8-15	Start or finish option
20-120	Initialise game variables. Insert at 100 POKE 36874, 15
160	Perform trackside calculation
170-180	Print track edge, set other side
190	Print other side
200-220	As above
230	Le Car! (apologies to Renault)
240-290	Control for left/right movement of car
310	Check for crash
320-330	Timer
340-350	Victory message

PCNProgramCards

Speed Race — Card 2 of 2

8320SR2/2

```
351 POKE 36876,195: POKE 36878,200
353 FORT=1TO200
354 NEXTT
355 POKE36876,200: POKE 36878,200
358 FOR I=1TO200
359 NEXTI
360 POKE36878,200: POKE 36876,205
362 FORI=1TO200
363 NEXTI
364 POKE36878,200: POKE 36876,210
366 FORI=1TO200
367 NEXTI
368 POKE36878,200: POKE 36876,225
370 FORT=1TO400
371 NEXTT
372 POKE36878,200: POKE 36876,200
374 FORI=1TO350
375 NEXTI
376 POKE 36878,0: POKE 36876,0
378 GOTO440
379 H=36864:V=36865

380 PRINT"▓▓▓▓"TAB(2)"YOU CRASHED INTO":PRINT"▓"TAB(3)"SPEED BARRIER AND"
390 PRINT"▓"TAB(4)"DIED IN":PRINT"▓"TAB(5)"THE▓ E▓X▓P▓L▓O▓S▓I▓O▓N"
400 FORT=1TO100:HM=INT(RND(1)*2+10):VM=INT(RND(1)*8+32):POKEV,VM:POKEH,HM
410 FORD=1TO25:NEXT:NEXT
420 POKEH,12:POKEV,38
430 FOROD=1TO1000:NEXT
440 PRINT"▓ TRY AGAIN.               TYPE ▓YES■ OR ▓NO■"
450 INPUT A$
460 IFA$="YES"THEN1
470 IFA$="NO"THEN 2000
480 GOTO 440
1000 IF N=0 THEN RETURN
1010 FOR I=1 TO N
1020 PRINT" ";
1030 NEXT I
1040 RETURN
2000 PRINT"▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓BYE-BYE"
2010 END
```

Lines	Description
351-376	Victory tune
378	Go to routine to play again
379	Horizontal and vertical registers in the Vic chip
380-430	Message and screen explosion routine
440-480	Prompt and response for another game
1000-1040	Routine to print road
2000-2010	End message

Clubnet keeps you in touch with enthusiasts throughout the U.K. It is divided into clubs and user groups. We publish a list of these groups on alternate weeks. This week clubs are listed alphabetically by county and town. Each week we focus on an individual club or group with a fly-on-the-wall report. If your association has something special on the agenda or if you've just started a new one, contact us at *Clubnet, Personal Computer News,* VNU, 62 Oxford Street, London W1A 2HS.

The clubs listing is based on that of the Association of Computer Clubs.

Burnley on the move



(From left) Gerald Smith, Phillip Jones (owner of VIC-20 equipment including double disk drive) and Clive Tallon (club secretary).

The meeting of Burnley Computer Club at the Carleton Hotel saw 50 members taking equipment up steep steps to the meeting room.

Formed little more than a year ago, the club's progress has accelerated at such a pace that it has been forced to find new headquarters for its 100-plus membership.

Secretary Clive Tallon said: 'Our present Tuesday night meeting place is just not big enough to house both the arcade games addicts and the more serious type of member.

'Our new rooms will enable us to split into groups and resume our monthly lectures on all branches of computing,' he continued.

The new location, which will take effect from August 4, consists of two large rooms in Burnley's Technical College, where members can look forward to talks on disk storage, a digital graphics system demonstration by Manchester Computer Club and an outline of CP/M.

A full course on Basic will also be given by local school teachers for the benefit of bemused parents whose children own computers.

Members include microprocessor engineers and programmers, some of whom are connected with the area's aerospace industry, and who can give help and advice. Others include young people, TV engineers and bus drivers.

Most makes of micro were on hand, with the Spectrum in the forefront, and according to Mr Tallon, the BBC, Vic 20 and Dragon 32 are also popular.

The club doesn't charge a membership fee or subscriptions, but relies instead on donations each week to pay for the cost of the meeting room.

But Mr Tallon pointed out: 'We are now very firmly established. We have been in existence for 18 months and there is no way the club is going to dry up and blow away.'

STUART ISENBERG

Name Burnley Computer Club **Venue** Carleton Hotel, Standish Street **Meetings** Every Tuesday **Contact** Clive Tallon, 27 Basnett Street, Burnley, Lancs.

CLUBS

AVON

Bristol Micro Computer Club. Meets at the Pavilion, Southend Road, Filton, Bristol, every other Tuesday. Darryl Collins, 60 Mackie Rd, Filton, Bristol BS12 7NA, 0272 792982.

Multi-User Club Valerie Boyde-Shaw, Nailsea 851337.

Worle Computer Club. Meets at Woodsprings Inn Functions Rooms on alternate Mondays at 7-10.30pm. H Bennett, 0934 514902 or F Feeney, 0934 833122.

BEDFORDSHIRE

Bedford Amateur Computer Club. Meets at Star Rowing Club, Bedford, on the first and third Tuesday of month 8pm. Rowan Bird, 74 High Street, Great Barford, MK44 3LB, 0234 870763.

Chiltern Computer Club. Meets at Five Bells, Eaton Bray, Near Dunstable, Leighton Buzzard on second and fourth Monday of each month. Contact Steve Betts, 42 Wallace Road, Eaton Bray, OU6 2DF, 0525 220922.

Luton College Computer Club. John Rodger, 0582 3411.

Luton Computer Club. J P Fletcher, 1 Trowbridge Gardens, Luton, LU2 7JY, 0582 450687.

BERKSHIRE

Easthampstead Computer Club. Meets at Easthampstead Park School, Bracknell, on the first Wednesday in month at 8pm. Brian Poulton, 0344 84423.

BIRMINGHAM

Birmingham Amateur Computer Club. Meets at CBS Consultants, Watery Lane, Small Heath, Birmingham 10, on the first and third Wednesday of each month at 7pm. Contact Dr M Bayliss, 125 Berryfield Road, Sheldon, B26 3UU, 021743 7197.

BUCKINGHAMSHIRE

Aylesbury Computer Club. Meets at Quarrendon Youth Club every Friday at 7.30pm and at Mandsville County Secondary School the first Thursday of each month at 7pm. Ken Knight, 22 Mount Street, Aylesbury, 0296 5181.

Chiltern Microcomputer Club. Meets at the Garden Centre, School Lane, Chalfont St Giles, on the first Wednesday of each month. Mrs W Tibbitts, Ellwood, Deanway, Chalfont St Giles. 024 07 4906.

Iver Computer Club. P A Seal, 1 Ormonde Flats, Church Road, Iver Heath, 0753 652792.

Iver Computer Society meets at Huntsmoor room, Iver Village Hall on the second and fourth Thursday every month at 7.30. John Haigh, 141 Leas Drive, Iver, SL0 9RP.

CAMBRIDGE

Cambridge Microcomputer Club, meets on the third Wednesday of month. Derek Tripp, 3 Spurgeons Avenue, Waterbeach. 0223 315662.

Haverhill Microcomputer Club, meets at St Marys' Church Hall, Camps Road, Haverhill, on the second, third and fourth Wednesday of month at 7.30 to 10.30pm. Andrew Holliman, 5 Trinity Close, Balsham, CB1 6DW, 022 029 583.

Peterborough Personal Computer Club meets at Crosfield Electronics Social Club, fortnightly on Mondays. Andrew Pike, 0733 44342 after 5pm.

CHESHIRE

Altrincham Computer Club. Meets at N. Cestrian Grammar School, Durham Road, Altrincham, fortnightly. Martin Hickling, 39 Barrington Road, Altrincham, WA14 1H2, 061 941 4547.

Brunel Computer Club. Meets at St Werburgh Community Centre on alternate Wednesdays at 7 to 10pm. Mr R Simpson, 4 The Coots, Stockwood.

Cheshire Computer Club. Contact W Collins, 37 Garden Lane, Chester, Cheshire.

Crewe Computer Users Club meets at Buffaloes Club, Earl Street, Crewe, on the third Thursday of each month at 8pm. Bram Knight, 0270 623375.

Holmes Chapel Micro Club meets at Leisure Centre, Holmes Chapel at 7.30 to 9.30pm on the first and third Tuesday of month. Margaret Baker, 1 Helton Close, Crewe. 0477 34238.

Kinder Peek Computer Club meets at Bew Mills School every Monday. John Eary, New Mills 43870.

New Mills & District PCC meets at New Mills School, fortnightly on Fridays at 7 to 9.30pm. Mr G M Flanagan, 11 Sundown Close, New Mills, Stockport, SK12 3DH, 0663 44051.

Northwest Computer Club meets fortnightly. John Lightfoot, 13 Aston Drive, Frodsham, Warrington, WA6 7PU. 0728 31519.

Northwest Computer Club, weekly meetings. Tom Wyatt, 29 Summer Lane, Halton, Runcorn Cheshire WA7 5PG. Runcorn 77545.

Mid-Cheshire Computer Club meets at Winsford Library on the second Friday every month at 7.30pm. Simon Sadler, Winsford 53339.

CLEVELAND

Cleveland Micro Club meets on the second and third Tuesday of each month, under 18s on second of month, over 21s on third Tuesday of month. J Telford, 13 Weston Crescent, Norton.

Stockton Amateur Computer Club meets at YMCA, Stockton, each alternate week at 7-9pm. Peter Cheshire, 60 Croft Road, Eaglescliffe, Stockton-on-Tees, TS16 0DY.

CORNWALL

Cornish Radio Amateur Club — Computing Section. Bob Reason, 24 Mitchell Road, Camborne.

Cornwall Area PAICC meets at the Penzance Micro Centre every Friday. S Zenith. Hayle 754845.

St Austell Computer Club and Computer Town meets at ECIP Labs, Penpewan Road, St Austell, fortnightly on Mondays at 7.30pm. N G Day, 2 Cilendale Close, St Austell, PL25 3DD.

DERBYSHIRE

Derby Micro Society meets at Littleover Church Hall, Sheperd Street, on every other Thursday at 7pm. Mike Riordan, 0332 769440.

Glossop Computer Club. John Dearn, 2 Spinney Close, Glossop.

DEVON

Exter & District Computer Club meets at Exeter School, Magdalene Road, Exeter, on the second and fourth Tuesday every month. T G Holden, 14 Greenville Avenue, Teignmouth, TQ14 9NT.

Exeter & District Amateur Computer Club meets second Tuesday every month. Doug Bates, Fortescue House, Stoke Cannon, Exeter. Specialist meetings on third and fourth Tuesday.

Torbay Users Computer Club meets at Devon Computers, 39 Totnes Road, Paignton on Mondays fortnightly.

DORSET

Bournemouth Area Computer Club meets at Kinson Community Centre on the third Wednesday every month. Peter Hibbs, 54 Runnymede Avenue, Bournemouth, BH11 9SE. 0202 576547.

TOPIC meets at Canteen English Truck Centre on the second and fourth Wednesday every month at 7pm. David Washford, 1 Alexander Road, Bournemouth, BH6 5JA.

Purbeck Computer Club, contact 31 North Street, Wareham, Dorset BH20 1AD.

DURHAM

Darlington Computer Club, weekly meetings. L Boxell, 8 Vane Terrace, Darlington DL3 7AT. 0325 67766.

ESSEX

Genius Computer Club. 30 Webber House, North Street, Barking.

Brentwood Amateur Computer Club, meets once a month. R Sadler, 18 Warescot Road, Brentwood, CM15 9HD. Brentwood 232463.
Springfield Computer Club meets on the first Friday of every month. Stephen Cousines, 1 Aldeburgh Way, Springfield, Chelmsford, CM1 5PB. 0245 50155.
Colchester Microprocessor Group meets at University of Essex on the second and fourth Wednesday of every month at 7.30pm. Information Centre, University of Essex, near Colchester.
Stanway School Computing Club, only school members at present. G Floyd, c/o Physics Department, Stanway School, Stanway, Colchester.
Dragon Independent Owners Association. Contact Doug Bourne, School House, Nevern Road, Rayleigh.
Romford Club, a new club. Mr D Norden, 138c Church Road, Romford.
South East Essex Computer Society meets at Hockey Club at Roots Hall, near Southend Football Stadium on Wednesday at 7.30pm. Robin Knight, 128 Little Wakering Road, Little Wakering, Southend-on-Sea. 0702 218456.

GLOUCESTERSHIRE
British Amateur Electronics Club. Mr J Margetts, 3 Bishopstone Close, Golden Valley, Cheltenham.
Cheltenham Amateur Computer Club meets on the third Tuesday of each month at 7.30pm. Mike Pullin 0242 25617 or Robin Phelps 0242 584343.
GCHQ. D W Adam, 16 Court Road, Prestbury, Cheltenham.
Cheltenham Amateur Computer Club meets at Prestbury Scout Headquarters, on the third Tuesday of every month at 7.30pm. M Hughes, 36 Riverviews Way, Cheltenham.

HAMPSHIRE
Commodore Computer Club. Meets on the first Friday of every month at Bury House, Bury Road, Gosport at 7.30pm. Brian Cox. Fareham 280530.
Fareham and Portsmouth Amateur Computer Club. Alan Smith, c/o Francis Close, Lee-on-the-Solent, Gosport, Hants PO13 8HB. 0705 550907.
RAF Odiham Computer Club. Contact c/o Officer i/c, Royal Air Force, Odiham, Nr Basingstoke, Hants.
Southampton Amateur Computer Club meets at Crestwood Centre, Shakespeare Road, Boyatt Wood, Eastleigh, Hants. on the second Wednesday of every month at 7.30pm. Paul Blitz. Chandlers Ford 69050.

HEREFORD
Hereford Amateur Computer Club, proposed new club. Stuart Edinborough, 2 Warwick Walk, Bobblestock, HR4 9TG. 0432 269700.

HERTFORDSHIRE
Harpenden Microcomputer Club meets at Silver Cap, Harpenden on alternate Mondays. David James, 5 Ox Lane, Harpenden AL5 4HH.

HUMBERSIDE
Grimsby Computer Club meets at Grimsby Central Library fortnightly on Mondays at 7.30pm. Jenson Lee, 29 Park View, Cleethorpes. 0472 4259.
Scunthorpe & District Microprocessor Society meets at Community Centre, Lindun Street, Scunthorpe, every Tuesday at 7.30pm. G Hinch, 21 Old Crosby, Scunthorpe, South Humberside DN15 8PU.

KENT
Canterbury ACC proposed new club. Contact L Fisher, 21 Manwood Avenue, St Stephens, Canterbury, CT2 7AH.
Medway Amateur Computer & Robotics Organisation meets on the first Tuesday and third Wednesday of month. Paul Cameron. Small Community Centre, Lordwood Lane, Lordwood, Chatham. 0634 63036.
North Kent Amateur Computer Club meets at Lecture Theatre, Charles Darwin School, Jail Lane, Biggin Hill, on the first Thursday of every month at 7.30pm. Iain House, 28 Canadian Avenue, Catford SE6 3AS. 01-690 5441.
Orpington Computer Club meets at The Large Hall, Christ Church, Chaterhouse Road, Orpington, every Friday at 8pm-10.30pm. Mr R Pyatt, 23 Arundel Drive, Orpington, Kent BR6 9JF. Orpington 20281.
Amateur Computer Club. Rupert Steele, St John's College, Oxford OX1 3JP.
National Personal Computer User Association. Eric Keeley, 11 Spratling Street, Manston, Ramsgate, Kent.
Sevenoaks School Computer Club. G Sommerhoff, Technical Centre, Sevenoaks School, Sevenoaks, Kent. 0732 456340.
Tonbridge & Tunbridge Wells ACC. Ray Szatkowski, 1 Cromer Street, Tonbridge. 0732 355960.

LANCASHIRE
Blackburn Micro Computer Club. Roger Longworth, 12 Sharp Close, Accrington.
Bolton Computer Club meets at E4/24 Bolton Institute of Higher Education, Deane Road, Bolton, on Thursdays. David Atherton, 16 Douglas Street, Asherton, Manchester M29 9FB. 0942 876210.
Burnley Computer Club meets at Carleton Hotel, Standish Street, on Tuesdays 7.30-11pm. Contact Clive Tallon, 27 Basnett Street, Burnley, BB10 3EQ.
Chorley Computer Club meets at Townley Arms, Chorley, every other Tuesday at 8pm. Chris Hicks, 131 Market Street, Chorley.
Ribble Valley Computer Club meets at Staff Canteen, Pendle Carpets Ltd, West Bradford, on the second and fourth Monday of month at 7-9pm. Contact Ian Thornton-Bryar, 25 Southfield Drive, West Bradford, Clitheroe, BB7 4TU.
Lancaster & Morecambe Computer Club. Sarah Blackler. 0524 33553.
South Chadderton Computer Club meets at Turf Lane Centre, Turf Lane, Chadderton, on Thursdays at 7-9.30pm. Mr Jakeman, 26 Marble Street, Derker, Oldham. 061-678 0547.

LEICESTERSHIRE
East Leake Computer Club. Andrew Jones, 59 Bateman Road, East Leake, Loughborough, LE12 6NN.

LINCOLNSHIRE
Lincoln Computer Club, meets at Blandings Public House, High Street, Lincoln on the first and third Wednesday of every month. John Clifford, 448 Newark Road, Lincoln LN6 8RX. 0522 2168.
Skegness Computer Club, meets at County Hotel every other Monday, 7.30-9.30pm. Reg Potter, 118 Beresford Avenue, Skegness. 0754 3594.

LIVERPOOL
BBC Microgroup Liverpool meets at Old Swan Technical College, Liverpool, on the first Wednesday of month. Nick Kelly, 56 Queens Drive, Walton, L4 6SH.

LONDON
Croydon Micro-Computer Club meets on the first and fourth Tuesday of month. Vernon Gifford, 111 Selhurst Road, Selhurst SE25 6LH. 01-653 3207.
Computer Users Club. Tony Latham 01-304 3910.
East London Amateur Computer Club meets at Harrow Green Library, Cathall Road, E11, on the second and fourth Tuesday of month at 7-10pm. Fred Linger on 01-554 3288.
Forum-80 London. Leon Jay, 01-286 6207.
Forum-80 Wembley. Victor Saleh, 01-902 2546.
Harrow Computer Group meets at Harrow College of Higher Education, Room W24, Northwick Park, on alternate Wednesday at 7pm. Bazyle Butcher, 01-950 7068.
Imperial College Microcomputer Club meets at room 145, level 1, on Tuesdays at

7.30pm. Tim Panton, c/o I.C. Union Office, Prince Consort Road, London SW7 2BB.
London School Computer Club. Burlington Danes School, Dane Building, DuCane Road, Hammersmith.
Metropolitan Police Amateur Computing Club meets on the first Thursday of month at 7pm. S Farley, 01-725 2428.
68 Microgroup meets at Regents Park Library, Robert Street, NW1, on the third Tuesday of month at 7.30pm. Jim Anderson, 41 Pebworth Road, Harrow, Middlesex.
North London Hobby Computer Club meets at the Polytechnic of North London, Holloway, N7 8DB, on Monday, Tuesday, Wednesday and Thursday during term time and one evening a week during holidays. Robin Bradbeer, 01-607 2789.
Paddington Computer Club meets at Paddington College, 25 Paddington Green, W2 1NB. Peter Hill, 01-723 5762.
Post Office HQ Microcomputer Club meets at room B145, River Plate House, 12-13 South Place, off Moorgate, on the second Thursday of month. Vernon Quaintance, British Telecom Enterprises, Cheapside House, 138 Cheapside EC2U 6JH. 01-726 4716.
The SOBAT Computer Club meets once a fortnight. Mr T Kayani, Berridge House, Hillfield Road, NW6.
South East London Microcomputer Club meets at Thames Polytechnic, Greens Ends, Woolwich SE18, on alternate Wednesdays at 7pm. Peter Phillipps, 61 Graigerne Road, SE3. 01-853 5829.
Southgate Microcomputer Club meets at Room B106 Southgate Tech, fortnightly on Thursdays at 7.30pm. Kevin Pretorius 01-882 2282. See Prestel page 25820645.
West London Personal Computer Club meets at Back room, Fox & Goose pub, Hanger Lane, Alperton, on the first Tuesday of month at 7.45pm. Graham Brain, 01-997 8986.

MANCHESTER
Manchester Computer Club meets at the Department of Computer Science, Manchester University, Oxford Road, on the first and third Thursday of month at 7.30pm. David Wade, 061-941 2486.
Small Business Computer Users Club. Proposed new club to meet the last Tuesday of month. K Wadsworth, 061-740 7232 after 5pm.

MERSEYSIDE
Bolton Computer Club meets Room E4/E24 Bolton Institute of Higher Education, Deene Road, Bolton, on Thursdays. David Atherton, 16 Douglas Street, Atherton, Manchester M29 9FB.
Merseyside Microcomputer Group meets at Merchant Taylor's School, Crosby, on second Thursday month. Mr F Shaw, 14 Albany Avenue, Eccleston Park, Prescot. 051-426 5536.
Southport Computer Club meets weekly. Ian Bristone, 28 Weld Road, Southport, Merseyside PR8 2DL. 0704 64524.
Wirral Microcomputer Users Group meets at Birkenhead Technical College every Monday. J Phillips, 14 Helton Close, Birkenhead, Merseyside L43 9HP.

MIDDLESEX
Sunbury Computer Club meets at St Benedicts Hall, Napier Road, Ashford, on the last Tuesday of month at 8pm. Simon Taylor, 8 Priory Close, Sunbury-on-Thames, Middlesex. Simon Clark, 83 Watling Street, Towcester, Northants NW12 7AG.

NOTTINGHAMSHIRE
Ashfield Computer Club meets at Carsic Junior School, St Mary's Road, Sutton in Ashfield on the first and third Thursday month. Derick Daines, c/o Cuttings Avenue, Sutton in Ashfield, Notts.
Eastwood Town Micro Computer Club meets at Devonshire Drive Junior School Wednesday at 5.45pm. Ted Ryan, 15 Queens Square, Eastwood, Nottingham NQ16 3BJ.
Nottingham Microcomputer Club meets at Castle Gate Centre, Nottingham, Monday at 7.30pm. Mr E Harvey, 68 Roseleigh Avenue, Nottingham NG3 6FH. Nottingham 608491.
Worksop Computer Group. New club, first meeting June 14 in Worksop library lecture room. Mr Andrews, Worksop 487327.

NORFOLK
Anglia Computer User Group. Jan Rejzl, 128 Templemere, Sprowton Road, Norwich. 0603-29652.
East Anglian Computer User's Group meets at Crome Community Centre, Telegraph Lane, Norwich. Gill Rijzi, 88 St Benedicts, Norwich.
South Northants Computer Group meets at Anchor House, Moat Lane, Towcester, on Wednesdays at 7.30pm.

OXFORDSHIRE
Association of Computer Clubs. Rupert Steele, St John's College, Oxford OX1 3JP.
Microsoc meets at Clarendon Lab, Parks Road, Oxford, every week during term. Rupert Steele, St John's College, Oxford OX1 3JP.
Oxford Personal Computer Club. Len Phelps, Southport Cottage, Sutton Courtenay, Nr Abingdon, Oxon OX14 4AU.
Ridgeway Computing Club meets at Swan Hotel, East Ilsley, on the second Tueday month. Mike Magney, Beavers, South Street, Blubury, Didcot, Oxon OX11 0JU.

SHROPSHIRE
Ludlow & District Microcomputer Club meets at Diocesan Education Centre, Lower Galdeford, Ludlow, on the second Monday of month at 7.30pm.
Shrewsbury Micro Club meets at Shrewsbury Shirehall once a month. Mr V Ives, 6 Bramley Close, Severn Meadows, Shrewsbury SY1 2TP.
Telford Computer Club meets at Telford ITEC on Monday 6-9pm. John Murphy, 10 Brichmore, Brookside, Telford TF3 1TF. 0952 595959.

SOMERSET
Sharp MZ80 Club, Tim Powell, Computer Centre, Yeovil College, Yeovil, Somerset.
Yeovil Computer Club. D G Carrington, 2 Romsey Road, Yeovil, BA21 5XN.

STAFFORDSHIRE
Alsager Computer Club, meets at Alsager Comprehensive School, Stoke-on-Trent, Staffs, fortnightly on Tuesday. Rex Charlesworth, 09363 77270.
The Amateur Computer Club of North Staffs meets on the third Wednesday month. J Roll, 16 Hill Street, Hednesford, Staffordshire WS12 5DS.
ICL Birmingham Branch Micro Club, c/o WBA Ecclestone, 26 Browns Lane, Tamworth, Staffs.
Tame Valley Computer Club, Tim Marshall, 32 Milton Avenue, Leyfields, Tamworth, Staffordshire B79 8JG.

SUFFOLK
Suffolk Microcomputer Club meets monthly. Mr S Pratt, c/o Microtek, 15 Lower Brook Street, Ipswich.

SURREY
Ashtead Computer Club meets on the last Thursday of month. Contact P Palmer, 8 Corfe Close, Ashtead.
Thames Valley Computer Club meets in Griffin Pub, Caversham. Phil Warn, Reading 594874.
Thames Valley Amateur Computer Club meets at Griffon, Caversham, on the first Tuesday of month. Brian Quarm, 25 Roundway, Camberley, GU15 1NR, Camberley 22186.
Ewell Micro Club, Dave De Silva, 316 Kingston Road, Ewell, KT19 0SU.
Farnham Computer Club, meets at Farnham 6th Form College, Morley Road, Farnham, on the second Wednesday of month. Adam Sharp, 14 Thorn Road, Boundstone, Farnham.
West Surrey Computer Club meets at Paddock Room, Green Man Public House, Burpham, Guildford, the first Thursday of month. Chris Karney, 0483 68121.
ITN Computer Club meets on Fridays. A Bond, 54 Farnham Road, Guildford, Surrey GU2 5PE, 0485 62035.
CBBS London meets on Sundays 4-10pm. P Goldman, PO Box 100a, Surbiton, KT5 8HY.
Sutton Library Computer Club meets at Central Library, St Nicholas Way, Surrey, on the first Friday of month at 6pm and second and third Tuesday of month. Dave Wilkins 01-642 3102.
Association of London Computer Clubs, Len Stuart, 89 Mayfair Avenue, Worcester Park, KT4 7SJ.
Worthing & District Microcomputer Club meets at Rose Wilmot Youth Centre, Littlehampton Road, Worthing, on alternate Sundays 11am-1pm. B. Thomas, 11 Gannon Road, Worthing, W. Sussex, BN11 2DT, 0903 36785.
Richmond Computer Club meets at Richmond Community Centre, Sheen Road, on the second Monday of month at 8pm. Bob Forster, 18a The Barons St Margarets, Twickenham, Middlesex, 01-892 1873.

SUSSEX
West Sussex Microcomputer Club meets at Room R06, Robinson Road Annexe, Crawley, on the first and third Monday of month. J Clarke, 31 Hyde Heath Court, Pound Hill, Crawley, 0293-884207
Mid-Sussex Microcomputing Club. Contact Jeff Hayden, 2 Hillary Close, East Grinstead, RH19 3XQ.
Arun Microcomputer Club meet at Wick Amenity Centre, Wick Farm Road, Littlehampton, on the first Monday of month at 8pm, and third Sunday of month at 6pm. P Cherriman, 7 Talbot Road, Littlehampton, West Sussex DN17 7BL

TYNE & WEAR
Newcastle upon Tyne Personal Computer Society meets at Room D103, Newcastle Polytechnic on the first Tuesday of every month. Pete Scargill, 21 Percy Park, Tynemouth, 0632 573905.

WEST MIDLANDS
Cannock Computer Society meets at Cannock Computer Systems, Old Penkridge Road, Cannock, fortnightly. Terry Sale, 20 Redwood Drive, Chase Terrace, Walsall WS7 8AS.
Walsall Computer Club meets at Park Hall Community School on the second and fourth Monday month 6.45-9.45pm. Alison Hunt, 58 Princes Avenue, Walsall, WS1 2DH, 0922 23875.
National Westminster Personal Computer Society. P Moore 021-236 6176, ext 382.
West Midlands Amateur Computer Club meets at Enfield School, Love Lane, Stourbridge, on the second and fourth Tuesday of month. John Tracey, 100 Booth Close, Brierley Hill, Kingswinford, 0384 70097.

WILTSHIRE
Chippenham and Calne, proposed new club. Matthew Jones, Pinhills, Calne SN11 0LY.

WORCESTER
Worcester & District Computer Club meets at Old Pheasant Inn, New Street, Worcester, on the second Monday month at 8pm. D Stanton, 55 Vauxhall Street, Rainbow Hill, WR3 8PA.

YORKSHIRE
Barnsley Co-Operative Computer User Group meets at Co-Op Social Club, Pogmore, Barnsley, on the last Tuesday month at 7.30pm. James Bridson, c/o 39 Kereforth Hall Road, Barnsley, South Yorks S70 6NF, 0226 41753.
Doncaster Amateur Computer Society meets in YMCA, Wood Street, on the first Wednesday of month. John Wilkinson, 316 Bawtry Road, Doncaster. 0302 868379.
Greenhead Grammar School Computer Club. Brian Smith, Greenhead Road, Keighley, West Yorks BD20 6EB, 0535 62828.
Huddersfield Computer Club meets every Monday. Chris Townsend, 760/4 Manchester Road, Linthwaite, Huddersfield, 0484 657299.
Leeds Microcomputer Users Group meets at 8 Regent Street, Chapel Allerton, fortnightly on Thursday at 6pm. David Parsons, 22 Victoria Walk, Horsforth LS18 4PL.
Program Power, R Simpson, 5 Wemsley Road, Leeds LS7 2BX, 0532 683186.
Pennine & District Computer Club meets at 26 Mill Hey, Haworth, W Yorks, on Saturday and Sunday. Douglas Bryant, 26 Mill Hey, Haworth, W Yorkshire, 0535 43007.
Shipley College Computer Group meets on Tuesdays. Paul Channell, tel: 0274 595731.
South Yorkshire Personal Computer Group meets at General Lecture Theatre, St Georges Building, Mappin Street, Sheffield, on second Wednesday month at 7.30pm. Paul Sanderson, 8 Vernon Road, Tetley, Sheffield S17 3QE.
Thurnscoe & District Micro Users' Club meets at Thurnscoe Comprehensive School, Physics Lab, Clayton Lane, Thurnscoe, Wednesday at 7.30pm during school term. Mr James Davis, 62 Tudor Street, Thurnscoe East, 0709 893880.
West Yorkshire Microcomputer Group meets on Tuesdays. Phillip Clark, c/o Suite 204, Crown House, Armley Road, Leeds LS12 2ES, 0532 632532.
York Computer Club meets at the Enterprise Club every Monday at 8pm. K Thomas, Green Lea, Ripon Road, Harrogate, HG1 2BY, 0904 38239.

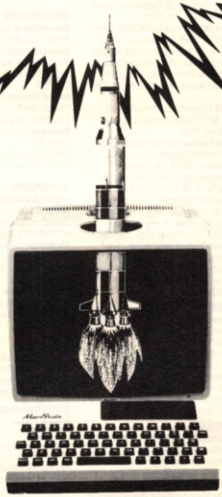
SCOTLAND
Bishopton Computer Club meets at 'Cwa Ben', Sachelcourt Avenue, Bishopton, Renfrewshire, on Sunday once a month Alasdair Law, 10 Dunglass Road, Bishopton, Renfrewshire PA7 5EF.
Edinburgh Home Computing Club meets at Claremont Hotel, Edinburgh, on the 2nd, 3rd and 4th Wednesday of month. I. Robertson, 031 441 2361.
Scottish Amateur Computer Society, Mike Anthony, 46 Moredun Park Gardens, Edinburgh EH17 7JR.
Central Scotland Computer Club meets at Falkirk College of Technology, Grangemouth Road, Falkirk, on the first and third Thursday of month. James Lyon, 78 Slamannan Road, Falkirk FK1 5NF.
Fife Computer Users Club meets fortnightly. Murray Simpson, 31 Tom Steward Lane, St Andrews, Fife, KY16 8YB.
Grampian Amateur Computer Society meets at 35 Thistle Lane, Aberdeen, on the second and fourth Monday every month at 7.30pm. Alan Morrison, 21 Beech Road, Westhill, Skene, Aberdeenshire AB3 6WR.
Kemnay Computer Club meets weekly. S Stubbs, 15 The Glebe, Kemnay, Inverurie, Aberdeenshire.
Inverness Personal Computing Club meets every second Tuesday at 7.30pm. Gyl Mackenzie, 38 Ardconnel Street, Inverness IV2 3EX, 0463 220922.
Perth & District Amateur Computer Society meets at Hunters Lodge Motel, Bankfoot, on the third Tuesday of month at 7.30pm. Alastair McPherson, 154 Oakbank Road, Perth PH1 1HA.
Strathclyde Computer Club meets at Wolfson Centre, 106 Rottenrow, Glasgow, on the third Wednesday of month. B Duffy, 24 Lomand Drive, Condorrat, Cumbernauld G4 8NW.

WALES
Abergele Computer Club meets at Abergele CI Offices every Thursday at 7.30-10pm. W Jones, 77 Millbank Road, Rhyl, Clwyd.
Colwyn Computer club meets at the Greens Hotel, Colwyn Bay, at 7pm. Contact D Bevan, c/o Abergele Road, Colwyn Bay, Clwyd LL29 7PA.
Gwent Amateur Computer Club meets at St Mary's Institute, Stow Hill, Thursday at 7.30pm. Rothery Harris, 16 Alanbrook Avenue, Newport, Gwent, Wales NPT 6QJ.
Pencoed Amateur Computer Club meets fortnightly on Saturdays at Pencoed Library. Philip Williams, 38 Bryn Rhedyn, Pencoed, Bridgend, Mid-Glamorgan CF35 6TL, 0656 860307.
Pontypool Computer Club meets at The Settlement, Roackhill Road, Pontypool, Gwent, on Friday. Graham Loveridge, on Pontypool 2827.
Swansea & Southwest Wales Amateur Computer Club meets on the last Friday every month. Paul Griffiths, 1 Prescelli Road, Penlan, Swansea SA5 8AF.

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PUBLISHER/DISTRIBUTOR This code refers to the distributor code table at the end of the listings, which will give the name and telephone number of the publisher/distributor.

COMMENTS — any other points of interest.

SOFTWARE

BUSINESS

	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied: Cassette	Media Supplied: Disk	Media Supplied: Cartridge	Mail order avail.	Hardware Required: Disk drive	Hardware Required: Joystick	Hardware Required: Other	Publisher/ Distributor	Comments
Accounting	£3,320	Apple II	●	Financial Controller	48K		●			●			S1	Also on Apple IIE. 8 modules (£402.50 each) — sales, purchase, invoicing, etc.
	£339.25	Apple II		General Ledger	48K		●		●	●			C1	Supports 1000 accounts and 100 analyses. Self-balancing, full audit trail.
	£552	Apple II		Informex Integrated Accounting System	48K		●		●	●			I1	Contains nominal, sales, purchase ledger + VAT. Can handle 800 accounts.
	£1,147.70	Apple II		Informex Integrated Business System	48K		●		●	●			I1	Contains accounting system modules plus invoicing + stock.
	£172.50	Apple II	●	Micro-General Ledger	48K		●		●	●			G1	Also on ITT 3030 and Basis 108. Goes through profit/loss + balance sheets.
	£402.50	Apple II	●	Nominal Ledger	64K		●			●		●	J1	Also on Sirius, IBM PC, Apple III + UCSD. Requires 132 column printer.
	£431.25	Apple II		Payroll	48K		●		●	●			C1	Supports weekly, monthly, + per monthly. Up to 350 employees per disk.
	£402.50	Apple II	●	Purchase Accounting & Cost Control	64K		●			●		●	J1	Requires 132 column printer, also Sirius, IBM PC, Apple III, UCSD.
	£402.50	Apple II	●	Sales Accounting System	64K		●			●			J1	Also on Sirius, IBM PC, UCSD. Provides conventional ledger.
	£339.25	Apple II		Sales Ledger	48K		●		●	●			C1	Supports 700 + accounts. Direct posting, credit control & 100 analyses, self balancing
	£1,725	Commodore 8000	●	Auditman	32K		●		●				C4	Also on Commodore 4000. Complete accounts production system.
	£1,552.25	Commodore 8000	●	Businessman	32K		●		●				C4	Also on Commodore 4000. Can be used with Auditman. 5 modules.
	£2,052.75	Commodore 8000		Data-Lex	32K		●		●	●			D1	Designed for solicitors + others who need to separate office & client's accounts.
	£2,070	Commodore 8000	●	Microfacts	32K		●			●			M1	Also on Commodore 700, Victor & Sirius. £345 per module. Integrated accounting.
	£454.25	Commodore 8000	●	Micro-simplex	32K		●			●		●	M2	Also on Commodore 64 (£172.50). Needs printer. For smaller retail business.
	£2,300	Commodore 4000	●	Pegasus Integrated Accounting Suite	32K		●			●			P3	Also on MS-DOS (128K). Contains six stand alone modules.
	£1,437.50	CP/M		Aurora Integrated Accounting Package	64K		●		●	●			G1	Five stand alone modules. Sales, invoicing, purchase, nominal and stock.
	£2,760	CP/M		Boss	64K		●		●				F1	Seven stand alone modules. Can link to Autowriter & Autoindex.
	£805	CP/M	●	Cash Book Accounting	64K		●		●	●			S2	Also on CP/M-86 and MS-DOS. Amalgamation of sales, purchase & nominal ledger.
	£2,300.00	CP/M		dBFlex	48K		●		●	●			E1	Open item six module accounting system, (£575.00) per module. Works with dBase II.
	£402.50	CP/M	●	Exact	64K		●		●	●			S3	Also on MS-DOS. Includes six modules — invoicing, ledgers, stock and payroll.
	£373.75	CP/M	●	Fast Nominal	60K		●		●	●		●	T1	Also on MS-DOS. Needs 132 character printer. Can define up to 99 report layouts.
	£3,059	CP/M		ISBS-W	64K		●		●	●			G2	Comes on hard disk. Contains ISBS functions plus job costing and purchase control.
	£1,840	CP/M	●	ISBS-S	48K		●		●	●			G2	Also on CP/M-86. Contains seven modules.
	£2,271.25	CP/M	●	Multi-Index	64K		●		●	●			B1	Also on MP/M & PC-DOS. Contains five modules. Sales, nominal, VAT & stock control
	£569.25	CP/M	●	Nucleus	64K		●		●	●			C2	Also on MS-DOS. Disk drives of 280K needed. A program generating system.
	£1,431.75	CP/M		Padmede Business Control System	64K		●		●	●			P2	Five modules (£286.35 per module). Nominal, sales, purchase, invoicing, stock.
	£1,380	CP/M	●	Motor Dealers Part Distribution	64K		●		●	●			S2	Also on CP/M 86 & MS-DOS. Combines stock control, order processing ledgers.
	£1,868.75	CP/M	●	Peachtree Basic Accounting Systems	48K		●		●	●			P1	Also on MP/M & MZ-DOS. Available on hard disk (£2,156.25). 5 stand alone modules.

	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied: Cassette	Media Supplied: Disk	Media Supplied: Cartridge	Mail order avail.	Hardware Required: Disk drive	Hardware Required: Joystick	Hardware Required: Other	Publisher/ Distributor	Comments
	£287.50	CP/M	●	Sales Ledger	64K		●		●	●			S2	Also on CP/M 86 and MS-DOS. Flexible ledger system.
	£45.42	Sharp MZ80A	●	Easy VAT	48K	●			●	●			K1	Also on Sharp MZ80B & M200K. VAT record system.
Agriculture	£1,150	Apple II		Dairy Package	64K		●			●			F2	Available on floppy or hard disk. Files individual cow production, with herd summaries.
	£1,725	Apple II		Financial Management Program	64K		●			●			F2	Available on floppy or hard disk. Accounts for farm/estate management.
	£1,150	Apple II		Management Program	64K		●			●			F2	Available on floppy or hard disk. Monitors individual field activities, budgets, etc.
Bill of Materials	£373.75	CP/M	●	Fastbill	60K		●		●	●			T2	Also on MS-DOS & TRS-DOS. Will give parts explosion at 10 levels, 99 items/level.
Bookeeper	£56.35	Apple II		Apple Bookeeper	48K		●		●	●		●	H1	Needs printer. Keeps petty cash, sales, other business books, sorts, analysis etc.
Building Specifications	£460	Commodore 8000	●	National Building Specifications	32K		●		●	●			C3	Also on Commodore 4000. Used with Wordcraft. Produces building specifications.
Business Graphics	£471.50	16-bit machines		Micro-Graphpower	128		●		●	●		●	I2	Needs plotter. Business graphics which plots business data.
	£120.75	Apple III	●	Business Graphics	48K		●			●			P6	Also on Apple II (£125.35). Supports range of plotters & pie-charts, etc.
	£149.50	IBM PC	●	Graph Magic	96K		●		●	●			F1	Also on Apple II, III. Displays files graphically. Reviewed 18.3.83.
Business Management	£569.25	Commodore 8000		The Administrator	96K		●		●	●			S11	Complete applications generator. No programming required.
	£4,140	CP/M		Peachtree Business Management System	48K		●		●	●			P1	Also on MP/M & Unix. Available on hard disk (£6,900). Six modules for single user.
	£684.25	IBM PC	●	Tomorrow's Office	128K		●		●	●			S11	Also on Sirius, Victor & MSDOS. Complete applications generator.
Cash Book	£224.25	Commodore 4000	●	Electronic Cash Book	32K		●		●	●			D1	Also on Commodore 8000 & 64. For small business or add-on products.
Cataloguing	£46.00	Apple II		Floppy Cat	48K		●		●	●			P4	Enables user to catalogue & store all information.
Estate Agents	£1,092.50	Apple II		Commercial Agency Systems	48K		●		●	●			C7	Matches in both directions with lists, labels and letters.
	£977.50	Apple II	●	Cyderpress Clients Recoverable Costs	48K		●		●	●			C7	Also on Rair Black Box. Designed to keep record of incurred expenditures.
	£1,121.00	Apple II	●	Cyderpress Residential System	48K		●		●	●			C7	Also on Rair Black Box. An applicant & property matching system.
	£419.75	CP/M		Estate Agents Match & Mail	56K		●		●	●			S4	Matches & prints out potential customers for every property.
Financial Accounting	£1,926.25	CP/M	●	Fast Range	60K		●		●	●		●	T1	Also on MS-DOS & TRS-DOS. Needs 132 character printer. 5 modules.
	£569.25	Commodore 8000	●	Finplan	32K		●			●			M3	Also on Commodore 3, 4, & 8000, Vic-20 and Commodore 64. £46.57 on floppy disk.
	£287.50	Commodore 8096		The Financial Director	96K		●			●			D1	Designed to handle large & complex planning & financial applications.
Financial Planning	£44.85	Commodore Pet		Busicalc	16K	●			●				S5	Also on Hytec & ICL PC. 96K version available. Helps decide on financial strategy.
	£188.60	Apple II	●	VisiCalc	48K		●		●	●		●	R1	Also on Apple III, Commodore & IBM PC, etc. The classic spreadsheet.
	£345.00	CP/M		Bottom-Line Strategist	48K		●		●	●			P4	A business/project forecasting program. Allows user to test business assumptions.
	£454.25	CP/M		Fastplan	64K		●		●	●			C5	Needs double density disks. A file based modelling system for business planners.
	£281.75	CP/M	●	Master Planner	64K		●		●	●			C5	Also on MS-DOS & CP/M 86. Needs 80 column printer. Upgrade of a spreadsheet.
	£396.75	CP/M	●	Micro Plan	64K		●		●	●			B1	Also on MP/M. Spreadsheet financial planner.
	£343.85	CP/M		Minimodel Financial Modelling	48K		●		●	●		●	G1	Needs 80 column screen. Model consolidation facility, colour option.
	£182.85	CP/M	●	Multi-Plan	48K		●		●	●			P4	Also on PC-DOS, Cromix, Fortune, Corvus & Sirius. Second generation spreadsheet.
	£44.85	CP/M		Plannercalc	64K		●		●	●		●	C5	Needs 80 column screen. Entry level system for spreadsheet planning.
	£218.50	CP/M		SP2020	48K		●		●	●			G2	Forecast effects of proposed actions. Aid to management decision-making.
	£172.50	CP/M		Supercalc	128K		●			●			A1	Electronic worksheet, representing a large flexible accounting work pad.
	£212.75	CP/M		Super Calculator	48K		●		●	●			E1	Spreadsheet calculator.
	£178.25	CP/M		T-Maker	48K		●		●	●			L1	Utility for analysis & presentation of numerical data & test material.
	£224.25	MS-DOS		Pulsar Business System	128K		●			●			A1	Consists of eight integrated packages & provides commercial accounting functions.
	£339.25	Osborne	●	PADA/C	64K		●		●	●			P2	Also on CP/M. Two systems. Incomplete records accounting, time/cost recording.
	£632.50	UCSD-P System		Microfinesse	128K		●		●	●			P5	Financial modelling program for businessmen.
	£741.75	UCSD-P System	●	Micro-Modeller	48K		●			●		●	I2	Also on CP/M & MS-DOS. Designed for large corporations.
Industrial Costing	£747.50	Apple II	●	Stock & Production Costing	48K		●		●	●		●	A2	Also on Apple IIE & III & Sirius. Available on hard disk. Needs Pascal system.
Insurance Accounting	£1,380	Commodore 4000	●	Insurance Man	32K		●			●			C4	Also in Commodore 8000, provides insurance broker with sales ledger.
Insurance Broking	£5,462.50	ICL DRS20		HS-100	64K		●		●	●		●	H2	Requires 16 or 27 Mb hard disk to run off. Maintains client & policy records.
Integrated Software	£569.25	IBM PC		Context MBA	256K		●			●			B2	Also on Sirius & Victor. Comprises word processor database management system.
	£908.50	Commodore 8000	●	Silicon Office	256K		●			●			F1	Integrated spreadsheet modelling, graphics, WP, database & communications.
Invoicing	£323.75	CP/M	●	Fast Invoicing	60K		●		●	●			T1	Also on MS-DOS & TRS-DOS. Can link into Fast Sales & Fast Stock.
Linear Programming	£373.75	CP/M	●	Optimiser	48K		●		●	●			C6	Also on Apple. Management tool for optimizing the deployment of scarce resources.
Local Authority	£862.50	Commodore 8000	●	P.U.S.W.A.	96K		●			●			M3	Also on Hytec. Monitors road holes under Public Utilities Street Work Act (1950).
	£569.25	Commodore 8000		Road Register	96K		●			●			M3	D-base network based on road names. Modules (£373.75) on street, lighting etc.

Mailing	£86.25	CP/M		Mailing List	56K		●		●	●			S4	Works with Super file. Prints labels, files, names & addresses. Mail merge facility.
Management	£226.16	CP/M	●	Scratch Pad 3.0	48K		●		●	●			M4	Also on CP/M 86, MS-DOS & PC-DOS. Spreadsheet using virtual memory.
Mathematics	£28.75	Commodore Pet	●	Infinite Arithmetic	16K	●			●				S5	Also on Commodore 3000, 4000 & 8000. Available on floppy disk.
Medical	£517.50	Apple II	●	Medical System	48K		●		●	●			A2	Also on Apple IIE, III & Sirius (£573.85). On hard disk. Age/sex register.
Office Information	£402.50	Apple II	●	Prophet II	48K		●		●	●			A4	Also on IBM PC & Corvus Concept. Information system which acts as a noticeboard.
Payroll	£69.00	Apple II		Payroll	48K		●			●		●	H1	Also available as cassette for Spectrum ZX81 (£25.00). Needs printer.
	£287.50	Apple II	●	Tabs Payroll	48K		●		●	●			T3	Also on CP/M & MS-DOS (64K). Up to 2000 employees, nine pay schemes.
	£977.50	CP/M	●	Powerday	48K		●			●			O2	Also on MP/M and MS-DOS. Integrates with Omicrons nominal ledger. Handles SSP.
Project Management	£747.00	IBM PL	●	Micronet	48K		●			●			T2	Also on ICL PC, Sirius, Superbrain, Apple II, & others. Critical path analysis.
Project Planning	£1,150.00	Commodore 8000		Hornet	32K		●			●			C3	Has eight optional variants (all eight £4,025). Network logic & variety of screen display.
Property Management	£517.50	Apple II	●	Property Management System	48K		●			●			A2	Also on Apple III, Apple IIe & Sirius. Prints rent reminders, demands etc.
Purchase Ledger	£287.50	Apple II	●	Tabs Purchase Ledger	48K		●		●	●			T3	Also on CP/M & MS-DOS (64K). Open item ledger — automatic payment facility, etc.
	£805.00	CP/M	●	Powerbought	48K		●			●			O2	Also on MP/M & MS-DOS. Integrates with Omicron's Nominal Ledger System.
Sales Ledger	£287.50	Apple II	●	Tabs Sales Ledger	48K		●		●	●			T3	Also on CP/M & MS-DOS. Part of integrated system. 300 analysis codes.
	£373.75	CP/M	●	Fast Sales	60K		●		●	●		●	T1	Also on MS-DOS & TRS/DOS. Needs 132 character printer. Part of Fast Range.
	£805.00	CP/M	●	Powersales	48K		●			●			O2	Also on MP/M & MS-DOS. Multi-user system based on mainframe software.
	£325	DEC Rainbow 100	●	Sales Ledger System	64K		●		●	●			D2	Also on DEC Mate II. Invoicing & monthly statement generating system.
Sales Order Processing	£805.00	CP/M	●	Compact Sales Order Processing	64K		●		●	●			C2	Also on CP/M 80, 86 & MS-DOS. Comes on hard disk. Control, stock, ledgers.
Sales, Purchase, Nominal Ledger	£1,207.50	CP/M	●	Compact Sales, Purchase & Nominal Ledger	64K		●		●	●			C2	Also on CP/M 80, 86 & MS-DOS. Follows standard accounting procedures.
Sick Pay	£80.50	Apple II	●	Statutory Sick Pay (SSP)	48K		●		●	●			H1	Also on Spectrum. Does all SSP calculations.
Statistics	£172.50	Apple II	●	Inter-Stat	48K		●		●	●		●	G1	Also on Basis 108 & ITT 3030. Needs printer.
	£287.50	Commodore Pet	●	Statistical Package for Personal Computers	32K		●		●	●			P7	Also on Commodore 64 (two modules at £99 each) & Sirius. Fully interactive.
	£9.20	Sharp MZ80A	●	Statistical Analysis	48K	●			●				K3	Also on MZ80K. Calculates mean & standard deviation for up to 100 items.
	£15.00	Sinclair ZX81	●	Critical Path Analysis (CPA)	8K	●			●				H1	Also on Spectrum (16K). Activities entered from arrow diagram. Finds critical path.
	£977.50	UCSD-P System		Trend Plot	128K		●		●	●		●	P5	Needs Hewlett Packard plotter. Developed to analyse historical time series data.
Stock Control	£373.75	CP/M	●	Fast Stock	60K		●		●	●		●	T1	Also on MS-DOS & TRS DOS. Needs 132 character printer.
	£3,289	CP/M		M-SIS	48K		●			●			T2	Stock control system for manufacturing industry.
	£33.92	Newbrain		Stock Control 40/4	32K	●			●				E2	Stores large quantities of stock, accumulates new stock levels & checks stock level.
	£25.00	Sinclair Spectrum	●	Stock Control	48K	●			●				H1	Also ZX81. Fast fwd/add/delete item. Prints complete or selective lists & total value.
Word Processing	£228.85	Apple II	●	Format 80	48K		●			●		●	P6	Also Apple IIe. Needs 80 column card. Storage/retrieval of names & addresses.
	£92.00	Apple II		Piewriter	48K		●		●	●		●	M5	Needs 80 column card. Allows entry, editing & print formatting of any text type.
	£125.35	Apple II		Wordhandler	48K		●		●	●			P4	Word processor for the non-professional — minimum Apple system.
	£152.95	Apple III	●	Apple Writer 2	48K		●			●			P6	Also Apple II. Has word wrap, glossary & word processing language.
	£28.50	BBC Model B		Alphabeta	32K	●			●				H3	Also available on disk. Suitable for home & business.
	£10.50	BBC Model B		Word Pro	32K	●			●				I4	Includes DELETE, INSERT, SAVE, Date etc.
	£90.85	Commodore 64		Infomast	64K		●		●	●			R2	Combined programmable word processor, Database and calculator.
	£89.00	Commodore 64	●	Paperclip	64K		●		●	●			A3	Also Commodore 8000. Compatible with WordPro & SpellPro.
	£488.75	Commodore 8000	●	Wordcraft	32K		●			●			D1	Also on SuperPet, Sirius 1, IBM PC & CBM 64. Routine correspondence, mailing, etc.
	£51.75	Commodore Pet	●	Papermate +	16K	●			●				S5	Also on Commodore 64, 3, 4, & 8000. Available on floppy (£53.49).
	£125.00	Commodore BK-20	●	Wordcraft 20	8K			●	●			●	A3	Also Commodore 64 — needs printer. Comprehensive word processor.
	£145.00	CP/M	●	Mail Merge	64K		●			●			X1	Also on CP/M 86 and PC-DOS. An optional MERGE, PRINT, extra for Wordstar.
	287.50	CP/M	●	Peachtext	48K		●			●		●	P1	Also MP/M & MS-DOS. Needs high quality printer. Contains proof reader.
	£339.00	CP/M	●	Perfect Writer/Speller	64K		●		●	●			S3	Also MS-DOS & Apple DOS. Contains quick reference card.
	£431.25	CP/M	●	Select Word Processing System	64K		●		●	●			B1	Also MP/M & PC/DOS. Screen-oriented system.
	£316.25	CP/M	●	Spellbinder	48K		●		●	●			E1	Also on Oasis. Word processing & office management system.
	£333.50	CP/M		WP2020	48K		●		●	●			G2	Menu-driven, machine independent. Set of key-tops provided.
	£225.00	IBM PC		Easywriter II	64K		●			●			X1	Bold face & underscoring on screen. 80,000 word spell checker extra (£43.15).
	£340.40	IBM PC		VisiWord	64K		●			●		●	R6	Mail merge facility with Visi file.
	£339.25	MS-DOS	●	WordStar	128K		●			●		●	A1	Also on CP/M. Needs printer. Complete screen-based WP.
	£40.25	Newbrain		Word Processor 40/12	32K	●			●				E2	Automatic word wrap, editing, saving paragraphs, deleting.
	£325.00	OS9		Stylograph	32K		●			●			S6	Expandable system with modular design.
	£45.42	Sharp MZ804	●	Wordpro	48K	●			●				K1	Also on MZ80B+K. Available on disk (£91.94). One of few WP packages for Sharp.
	£49.95	Tandy TRS 80 I	●	AJ Edit	32K		●		●	●		●	M6	Also on Genie I & II. Needs printer.

	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied: Cassette	Media Supplied: Disk	Media Supplied: Cartridge	Mail order avail.	Hardware Required: Disk drive	Hardware Required: Joystick	Hardware Required: Other	Publisher/ Distributor	Comments
EDUCATION														
Basic Course	£9.95	Texas Instruments 99/4A		Beginners Basic Tutor	16K	●			●				T5	Gives explanations and examples of TI Basic — lets the user try.
	£13.95	Texas Instruments 99/4A		Teach Yourself Extended Basic	16K	●			●				T5	Needs extended Basic module.
Business Game	£9.95	BBC Model A	●	Business Game	16K	●			●				W1	Also on Model B. Two games for economics, business & general studies, teaching.
	£5.95	BBC Model B	●	Inkosi	32K	●			●				C9	Also on Vic-20. Rule for ten years, overcoming obstacles, e.g. famines.
Chemistry	£14.38	Research Machine 380Z	●	Symbols To Moles	31K		●		●	●			H4	Also on Apple II. Practise using chemical symbols, writing & mole concept.
Children	£37.89	Apple II		Bumble Plot	48K		●		●	●			P4	A set of five programs for developing graphics and maths skills. For children 8 to 13.
	£29.84	Apple II	●	Face Hanger	48K		●		●	●			P4	Also on IBM PC. Designed for children to learn computer keyboard by building up face.
	£37.89	Apple II		Gertrude's Secret	48K		●		●	●			P4	An educational game to teach logical thinking & planning. For children aged 6-9.
	£9.80	Atari 400	●	Jigsaw Puzzles	16K	●							T4	Also on Atari 800. Has 16 puzzles and optional difficulty.
	£9.95	BBC Model B		Letters	32K	●			●				C9	Designed for children aged 4-6 & for dyslexic & remedial children.
	£9.95	BBC Model B	●	Metrics	32K	●			●				C9	Also on Vic-20 + Spectrum. Structure of metric system, for children aged 10-15.
	£5.95	BBC Model B	●	Pascal	32K	●			●				C9	Also on Vic-20. Shows construction of Pascal Triangle and tests on it.
	£5.95	BBC Model B	●	Sequences	32K	●			●				C9	Also on Vic-20. Demonstrates number patterns.
	£6.50	BBC Model B		The Early Stages	32K	●			●				H3	Reading aid. Plays nursery rhymes. Available on disk.
	£4.50	BBC Model B		Super Hangman	32K	●			●				I4	Version of famous game. High resolution graphics. 800 words or enter own choice.
	£9.95	BBC Model B		Tree of Knowledge	32K	●			●				A9	Interactive program teaching categorisation. Simplified information retrieval.
	£4.95	Sharp MZ80A	●	Giant Maths	32K	●			●				S8	Also on MZ80K. Big screen figures & humorous error messages. 5 to 11 years.
	£4.95	Sharp MZ80A	●	Rocket	3K	●			●				S8	Also on MZ80A. Four difficulty levels. For five to 11 year olds.
	£9.20	Sharp MZ80A	●	Teach Tables	48K	●			●				K3	Also on MZ80K. Plays like game but motivates children to improve their ability.
	£4.95	Sharp MZ80K	●	Master Builder	48K	●			●				S8	Also on MZ80A. Repair a wall using random blocks. Teaches spacing.
	£5.25	Spectrum		Alphabet	48K	●			●				W2	'Picture for each letter of the alphabet. Option for lower case.' Aimed at ages 2-6.
Classroom Monitor	£322.00	UCSD-P	●	Classroom Monitor	64K		●		●	●			K4	Also on Apple II. Provides demonstration facilities & monitors student's progress.
Economics	£28.75	Sharp MZ80K	●	Broadwater Economics Simulation	16K	●			●				W1	Also on Commodore Pet & BBC. Simulates micro & macro economics.
French	£14.38	Research Machine 380Z	●	Repondez	31K		●		●	●			H4	Also on Apple II. Practising French verb formation (present tense).
	£9.20	Sharp MZ80A	●	French Conjugate	48K	●			●				K1	Also on MZ80K. Automatically conjugates regular verbs into tenses.
	£9.20	Sharp MZ80A	●	French Verbs	48K	●			●				K1	Also on MZ80K. Allows user to impart up to 20 verbs & eight tenses at a time.
Graphics	£8.00	BBC Model B	●	Painter	32K	●			●				A5	Also on Spectrum (£5.75), Atom (£6.90) & on disk.
	£9.95	BBC Model B		Creative Graphics	16K	●			●				A9	Book available (£7.50). Designed to illustrate BBC graphics.
History	£20.13	Sharp MZ80A	●	Kings & Queens	48K	●			●				K1	Also on MZ80K. Facts & figures on English monarchs since 1066.
Languages	£7.95	Sharp MZ80A	●	Multilinguist	3K	●			●				S8	Also on MZ80K. A language tutor to suit all European languages.
Mathematics	£8.95	BBC Model B		Angle	32K	●			●				C9	Also on Spectrum. Includes four programes designed to teach simple geometry.
	£9.95	BBC Model A	●	Algerbraic Manipulations	16K	●			●				W1	Also on Model B. Includes four programs designed for use in maths teaching.
	£82.80	IBM PC		Fact Track	64K		●			●			I3	Learning basic arithmetic. Presents simple two-line sums in random order.
	£46.00	Sharp MZ80A	●	Curve Fitting	48K	●			●				K3	Also on MZ80K. Calculates, intercepts & plots power curve.
	£9.20	Sharp MZ80A		Directed Numbers	48K	●			●				K3	Also on MZ80K. Teaches difficult mathematical functions.
	£9.20	Sharp MZ80A	●	Divisor Advisor	48K	●			●				K3	Also on MZ80K. Teaches division at a variety of skill levels.
	£27.60	Sharp MZ80A	●	Numerical Integration	48K	●			●				K3	Also on MZ80K & B. Teaches Simpson's Rule.
	£5.25	Spectrum		Counting	16K	●			●				W2	Graded programs. 'Good as a first introduction to numbers.' Aimed at ages 3-6.
Meteorology	£23.00	Research Machines 380Z	●	Weather	31K		●		●	●			H4	Also on Apple II. Gives synoptic charts. Teaches elementary meteorology.
Morse Code	£9.20	Sharp MZ80A	●	Morse Tutor	48K	●			●				K3	Also on MZ80K. Used to teach morse code by sight and sound. At seven levels.
Physics	£14.38	Research Machines 380Z	●	Lenses	31K		●		●	●			H4	Also on Apple II. Illustrates formation of images by lenses using ray diagrams.
	£9.20	Sharp MZ80A	●	Casino Chips	48K	●			●				K3	Also on MZ80K. Uses radioactive chips to teach half-life concept.
Typing	£28.75	CP/M	●	Touch'n'Go	48K		●		●	●			C6	Also on MS-DOS. Typing tutor for mastering numeric pad & Qwerty keyboard.
	£31.05	IBM PC		Typing Tutor	64K		●			●			I3	Presents exercises for learning touch typing or for improving existing skills.
GAMES														
Adventure	£17.95	Atari	●	Arrow of Death	16K	●			●				C8	Also runs on TRS-80, BBC, Vic-20. A 'classic text adventure'.
	£7.99	BBC Model B	●	Adventure	16K	●			●				M7	Also runs on Atom. 'Many rooms to explore and many hazards to overcome'.
	£9.95	BBC Model B		Philosopher's Quest	16K	●			●				W1	'Progress through a world of fiendish puzzles.'

	£9.95	BBC Model B		Sphinx	16K	●			●				W1	'A classic adventure, moving through caves avoiding hazards to collect treasure'.
	£13.80	Commodore Pet	●	Hitch-Hikers Guide to the Galaxy	32K	●			●				S5	Also runs on Commodore 64, Vic-20, 3000, 4000, 8000. 'Involved, textual game'.
	£18.40	Commodore Pet		Pythonesque	32K	●			●				S5	'Increasingly difficult textual game based on Monty Python'. Disk available (£20.12)
	£24.99	Commodore Vic-20		River Rescue	8K			●			●		T4	Needs joystick. 'Captain boat through treacherous rivers to rescue explorers'.
	£8.00	Dragon 32		Escape	32K	●			●		●		M12	Needs joystick. 'A 3D maze game. Get clues from 15 rooms for code of elevator'.
	£8.00	Dragon 32		Flipper	32K	●			●				M12	'A game of intrigue and strategy. Requires an agile mind and a lot of fore-thought'.
	£8.00	Dragon 32		Mansion Adventure	32K	●			●				M12	'Wind your way through an old mansion picking up clues to find the diamond',
	£7.95	Dragon 32		Wizard War	32K	●			●		●		S7	Needs joystick. 'Magical combat for two to nine players; interactive duel'.
	£35.00	IBM PC		Adventure in Serema	64K		●					●	I3	Needs colour graphics adaptor and direct drive colour monitor for use.
	£6.90	Oric	●	Zodiac	16K	●			●				A5	Also runs on Atom. 'A thinking persons adventure game'.
	£12.07	Sharp MZ80A	●	Adventure	48K	●			●				K1	Also runs on Sharp MZ80B and MZ80K. 'An interactive adventure game'.
	£12.07	Sharp MZ80A	●	Quest	48K	●			●				K1	Also runs on Sharp MZ80B and MZ80K. 'Dungeons & Dragons type game'.
	£7.95	Sharp MZ80K	●	Nightmare Park	48K	●			●				S8	Also runs on MZ80A. 'Cross Nightmare Park. Every few steps play game or task'.
	£7.95	Sharp MZ80K	●	Tombs of Karnak	48K	●			●				S8	Also runs on MZ80A. 'Bargain for items required before entering tombs'.
	£5.95	Spectrum		Faust Folly	16K	●			●				A6	'A 16K adventure with the same traps, magic, fiends, treasure as the 48K game'.
	£14.95	Spectrum		The Hobbit	48K	●			●				M8	'Object is to get treasure. For one player. Can instruct computer in ordinary English'.
	£5.00	Spectrum	●	Orb	16K	●			●				I5	Also runs on Dragon 32 and Commodore Vic-20. 'Explore labyrinth and destroy Orb'.
	£10.00	Spectrum	●	Pimania	48K	●			●				A7	Also runs on Sinclair ZX81, BBC 13, Dragon 32. Reviewed 18.3.83.
	£5.00	Spectrum	●	The Quest	48K	●			●				I5	Also runs on Dragon 32. 'Fighting adventure game'.
	£5.00	Spectrum	●	Star Trek	48K	●			●	●			I5	Also runs on Dragon 32 and Commodore Vic-20. 'Hunt down the Klingon in space'.
	£5.95	Spectrum		Slippery Sid	16K	●			●		●	●	S9	Needs joystic and keyboard to use. 'Snake type game'.
	£10.06	Tandy TRS-80 I	●	Mysterious Adventures	16K	●			●				M6	Also runs on Tandy TRS-80 III, Genie I, II, Colour Genie.
	£4.95	Texas Instruments 99/4A		Forbidden City	16K	●			●				A8	'You have to explore a deserted alien city with many hazards on the way'.
	£3.95	Texas Instruments 99/4A		Sorcerers' Castle	16K	●			●				A8	'You are trying to rescue the captured princess'.
	£7.50	BBC Model B		Atlantis	32K	●			●				I4	'Guide submarine through caverns & destroy enemy'.
Arcade type	£9.99	Commodore Vic-20		Night Crawler	5K	●			●				R2	'A Centipede style game. Fast action, graphics and sound effects'.
	£5.50	Spectrum	●	Arcadia	16K	●			●				I6	Also on Commodore Vic-20. '12 levels of aliens attacking in different ways'.
	£5.95	Spectrum		Ground Attack	16K	●			●				S9	'Variable speeds allows this game to be played by everyone'.
	£3.95	Texas Instruments 99/4A		Bomber	16K	●			●				A8	'Must land plane & bomb skyscrapers'.
	£5.95	Spectrum		Cyber Rats	16K	●			●		●	●	S9	Needs joystick and keyboard to run.
Asteroids type	£4.95	Spectrum		Meteor Storm	16K	●							Q1	'Progressive difficulty, variety of controls'.
	£6.95	Spectrum		Time-Gate	48K	●			●				Q1	'Time travel, 3D graphics, colour, cockpit view and instrument display'.
	£4.95	ZX81		Asteroids	4K	●			●				S9	'Fast moving, suitable for all ages'.
Ballooning	£14.95	Atari 400	●	Up Up Away	16K	●			●				S13	Reviewed in *PCN* week ending April 29. Also on Atari 800. Available on disk.
Centipede type	£7.99	Dragon 32		Caterpillar	32K	●			●		●		M12	'A new generation munching game'.
Chess type	£7.99	BBC Model B		Chess	16K	●			●				M7	'Machine code, high resolution graphics with many play options'.
	£24.95	Dragon 32		Cyrus Chess	32K			●					D3	'Won European microcomputer chess championship 1981. Nine levels of difficulty'.
	£14.50	Sharp MZ80A	●	Chess	48K		●	●					K1	Also on Sharp MZ80B & MZ80K. '14 levels of difficulty'.
	£42.95	Texas Instruments 99/4A		Chess	16K		●	●					T5	'Different difficulty levels. Will solve problems. Can teach chess'.
Darts	£19.99	Atari 400	●	Darts	8K	●					●		T4	Also on 800. 'Aim & throw — the computer does the arithmetic'.
Defender type	£22.80	Atari 400/800	●	Submarine Commander	16K			●		●			T4	'One player. Nine levels of difficulty. Destroy shipping. Oxygen levels, fuel etc'.
	£9.95	BBC Model B		Planetoid	32K	●			●				A9	'A game of speed & skill'. Available on floppy disk (£11.50).
	£7.95	Commodore Vic-20		Alien Blitz	5K	●			●		●		A3	Needs joystick to run. 'Difficulty levels, colour & sound'.
	£9.99	Commodore Vic-20		Annihilator	3K	●			●		●		R2	'Based on Defender'.
	£6.95	Spectrum		Penetrator	48K	●			●				M8	'Two levels of difficulty difficulty'.
	£21.95	TI 99/4A		Parsec	16K			●	●				T5	'Increasingly difficult. After four onslaughts pass through to next stage'.
Flight Simulator	£22.80	Atari 400	●	Jumbo Jet Pilot	16K	●					●		T4	Also Atari 800. 'Ten difficulty levels. View through cockpit with flight instrumentation'.
	£7.95	Spectrum	●	Flight Simulation	48K	●			●				S10	Also on ZX81 (£5.95). 'Shows control panel & control view'.
	£17.20	Tandy TRS-80	●	Jumbo	16K	●			●				M6	Also on Genie I, II & BBC Model B. 'Simulation of piloting a Jumbo'.
Football	£29.99	Atari 400	●	Kick Back	8K			●			●		T4	Also available on Atari 800. Needs joystick to run. 'Beat the high score'.
	£19.55	Atari 400	●	Soccer	8K			●					T4	Also on Atari 800. 'Aerial view of field.' Reviewed 11.3.83.
Frogger type	£5.50	Commodore Vic-20		Wacky Waiters	3.5K	●			●				I6	'Waiter serving drinks in hotel. Has to hop from lift to lift'.
	£9.99	Commodore Vic-20		Hopper	3K	●			●		●		R2	'A version of Frogger'.
	£5.95	Spectrum		Horace Goes Ski-ing	16K	●			●				S10	'Sequel to Hungry Horace. He must cross busy road, fetch skis & ski down slope'.
Golf	£7.95	Dragon 32		Golf	32K	●			●				S7	'For one or two players. Full handicapping system'.

	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied: Cassette	Media Supplied: Disk	Media Supplied: Cartridge	Mail order avail.	Hardware Required: Disk drive	Hardware Required: Joystick	Hardware Required: Other	Publisher/ Distributor	Comments
	£3.75	Spectrum		Golf	16K	●			●		●		R3	'For one or two players. Choice of nine or 13 holes'.
	£3.75	Sinclair ZX81		Golf	16K	●			●		●		R3	'Similar to other golf games, in black and white'.
Helicopter	£24.95	Commodore Vic-20	●	Chop Lifter	8K			●	●		●		A3	Also on Commodore 64. Needs joystick to run. 'Vic version of USA's best-seller'.
Jigsaw	£14.99	Atari 400	●	British Heritage Jigsaw Puzzle	8K	●							T4	Also on Atari 800. 'Educational game with selective difficulty'.
Kong type	£7.95	Commodore Vic-20		Bonzo	8K	●			●		●		A3	'Workman dodges robots on split-level. Sound & full graphics.
	£8.00	Dragon 32		Donkey King	32K	●			●		●		M12	'Popular arcade game'.
	£9.95	BBC Model B		Monsters	32K			●					W1	'The player has to run up & down ladders & along walls, pursued by monsters'.
Maze type	£24.95	Dragon 32		Ghost Attack	N/A			●			●		D3	'The aim is to avoid & eliminate ghosts which roam a maze'.
	£8.00	Dragon 32		Jerusalem Adventure	32K	●			●				M12	'Aim is to get treasure & avoid being eaten'.
	£5.95	Spectrum		Hungry Horace	16K	●			●				S10	'Animated maze game with sound & full graphics'.
	£4.95	Spectrum	●	Mined-Out	48K	●			●				Q1	Reviewed in *PCN* week ending April 22. Also on Dragon 32.
	£5.95	Spectrum		Muncher	16K	●					●		S9	'A monster munching marathon'.
	£8.00	Spectrum		Spectres	16K	●							B3	'An increasingly difficult maze game. The object is to fit light bulbs & destroy ghosts'.
	£10.00	Sinclair ZX81		Mazogs	16K	●							B3	'Three levels. Find & collect treasure in a maze & escape'.
Pacman Type	£9.95	BBC Model B		Snapper	16K	●			●		●		W1	'Based on Pacman'.
	£9.50	Colour Genie		Chomper	16K	●							K2	'Based on Pacman'.
	£8.00	Dragon 32		Scarfman	32K	●			●				M12	'Based on Pacman'.
	£4.95	Spectrum		Gnasher	16K	●			●				R3	Joystick optional. 'Based on Pacman using Beano characters'.
Pool	£8.50	BBC Model B		Billiards	32K	●			●				H3	Available on disk. 'A game for all ages'.
Racing	£7.95	Dragon 32		Grand Prix	32K	●			●		●		S7	'For one or two players, features eight Grand Prix tracks & 10 levels of difficulty'.
	£21.95	TI 99/4A		Car Wars	16K			●	●				T5	'Race through maze whilst avoiding computer controlled car'.
Science Fiction	£19.95	Apple II		Lunar Leeper	16K		●			●			S12	Reviewed in *PCN* week ending April 22.
Shooting	£29.95	Atari 400	●	Claim Jumper	16K			●	●		●		C8	Also on Atari 800. 'A two player shoot-out over gold nuggets & cash'.
	£29.95	Atari 400		Shamus	16K			●	●		●		C8	'Player has to move through lair avoiding hazards'.
	£5.95	BBC Model B	●	Invisible Man	32K	●			●				C9	Also on Commodore Vic-20. 'Aim is to shoot man who keeps disappearing'.
	£9.99	Commodore Vic-20		Quacker	3K	●			●		●		R2	'Aim is to shoot down ducks & rabbits on shooting gallery'.
	£19.95	Commodore Vic-20	●	Spiders of Mars	N/A			●	●				A3	'Popular game for the Vic-20'. Also on Commodore 64.
	£5.95	Spectrum		High Noon	16K	●			●		●		A6	'Clean up chaos & disorder in town'.
Space	£9.95	Dragon 32		Dragon Trek	32K	●			●		●		S7	'A version of Star Trek with ten levels of difficulty'.
	£5.95	Spectrum		Android Run	16K	●			●		●		A6	'Control android to shoot walls, kill mutants & reach central complex'.
	£5.95	Spectrum		Cosmos	16K	●			●		●		A6	'Defend space convoy from aliens & asteroids'.
	£5.50	Spectrum		Schizoids	16K	●			●				I6	'Space bull-dozer nudges shapes into black hole'.
	£5.95	Spectrum		Starship Enterprise	48K	●			●				S9	'Based on the classic Star Trek. Includes arcade action'.
	£4.95	Spectrum	●	Star Trek	48K	●			●				R3	Also on ZX81 (£3.95). 'One player, sound & full colour graphics strategy game'.
Space Invader type	£7.99	BBC Model B		Swoop	32K	●			●				M7	'Written in machine code with full colour & high resolution graphics'.
	£7.50	BBC Model B		Model B Invaders	32K	●			●				I4	'A Space Invaders game with high resolution & colour graphics'.
	£9.99	Commodore Vic-20		Orbis	3K	●			●		●		R2	'Based on Missile Command. Fast & colour'.
	£19.95	Dragon 32		Cosmic Invaders	N/A			●					D3	Joystick optional. '15 levels of difficulty'.
	£6.50	Spectrum		Destroyer	16K	●			●				I5	'Destroy the varying alien invaders'.
	£4.95	Spectrum		Intruders	16K	●			●				Q1	'Includes mutants, random saucers, bonus base & 14 different aliens. Sound & colour'.
	£5.00	Spectrum		Spectral Invaders	16K	●							B3	'For one or two players. Increasingly difficult, high resolution colour graphics'.
	£21.95	TI 99/4A		Invaders	16K			●	●				T5	'Based on Space Invaders. After every two screens a new character appears'.
	£3.95	Sinclair ZX81		Invaders	4K	●			●				S9	'Based on Space Invaders'.
Sport	£33.35	IBM PC		Decathlon	64K		●			●		●	I3	Needs colour graphics adaptor & direct drive colour monitor. 'For up to six players'.
Strategy	£7.95	Dragon 32		Wizard War	32K	●			●				S7	Reviewed in *PCN* week ending April 8.
Variety	£5.95	Commodore Vic-20		Innovation Cassette	48K	●			●				M8	'One tape containing seven games'.
	£5.95	Spectrum		Over the Spectrum	16K	●			●				M8	'One tape with 10 games. Defender to geometry, beginners to advanced'.
Various	£29.95	Atari 400	●	Picnic Paranoia	16K			●	●		●		C8	Also on Atari 800. Needs joystick to run. 'A graphics game based on picnic site'.
	£4.95	Colour Genie		Breakout	16K	●			●		●		M9	'Different levels of skill'.
	£6.95	Commodore Vic-20		Amok	5K	●			●				A3	'Chased by robots in enclosed room. Different levels of difficulty'.
	£9.95	Commodore Vic-20		Black Squid	3K	●			●		●		C8	'Get men to shore in shortest time'.

	£24.95	Commodore Vic-20		Mutant Herd	8K			●			●		T4	'Protect a powerhouse from mutants. Enter their burrows & destroy eggs'.
	£6.90	Dragon 32		Dead Wood	32K	●			●				A5	'A game for all the family'.
	£3.95	Texas Instruments 99/4A		Chalice of Kalmar	16K	●			●				A8	'The aim is to retrieve a chalice from a temple'.
Clubs and Sports	£78.00	Sharp MZ80A		Clubman	48K	●			●				S8	Golf handicapping and competition results system complying with 1983 regulations
	£575.00	Apple II	●	Tabs Golf Package	48K		●		●	●			T3	Alsom on MS/DOS (64K). Maintains members handicaps including 1983 regulations.
	£28.18	Epson HX20	●	Horse Race Forecast	48K	●			●				K1	Also on Newbrain and Sharp. A punters aid to betting.
	£28.69	Sharp MZ80A	●	Navex	48K	●			●				K1	Also on MZ80K. Simulations of navigating a yacht on the English Channel.
Diary	£9.95	BBC Model A	●	Desk Diary	16K	●			●				W1	Also on BBC Model B. Consists of address book & diary planner (plus instructions).
Home budget	£19.99	Atari 400	●	Home Financial Management	8K	●						●	T4	Also on Atari 800. Needs Atari Basic cartridge. Aids money management.
	£19.95	Epson HX20	●	Home Budget	16K	●			●				K1	Also on Sharp, MZ80 & Osborne. Keeps records of home finances with graphics.
	£14.95	Sharp MZ80A	●	Sam Analysis	3K	●			●				S8	Designed for balancing home debits & credits.
Music composition	£24.99	Commodore Vic-20		Vic Music Composer	8K			●					T4	Aids to aspiring composer. Also for entertainment and education.
Stock control	£10.00	Spectrum		Spec File	48K	●			●				A5	Stock control program useful in home, e.g. record collection, etc.
Various	£12.95	Commodore Vic-20		Home Office	5K	●			●				A3	Comprises VicPro (word processor) & VicData (A database program).
UTILITIES														
Basic	£201.25	CP/M		Basic 80	48K		●		●	●			L1	Industry standard Basic.
	£235.70	CP/M		Basic Compiler	48K		●		●	●			L1	Companion to Basic 80. Allows programs to run faster.
	£80.50	CP/M		BDS C Compiler	48K		●		●	●			L1	A subset of 'C' that enables its implementation. Includes symbolic debuggers.
	£121.90	CP/M	●	C Basic	64K		●			●			X1	Commercial Basic. Also on CP/M86 (£265.65).
	£213	Any Z80		X-Basic	48K		●			●			X1	Built-in matrix functions. Supports MP/M record locking. Graphics option.
Basic Upgrader	74.75	Commodore 64	●	VicTree	64K	●			●				S5	Also Commodore Vic-20. Also on floppy (£92.00). Adds 50 commands to Basic.
Card Index System	£215.05	Apple II	●	VisiDex	48K		●			●		●	R1	Also on IBM PC. Needs printer. One record/screen designed for cross-referencing.
	£178.25	CP/M	●	Cardbox	48K		●		●	●		●	C6	Also on MS-DOS. Needs 24×80 VDU & 100K disk storage.
Communications	£102.35	Apple II		ASCII Express — The Professional	48K		●		●	●		●	P4	Needs RS232. Asynchronous serial communications package.
	£448.50	Apple II		Editel	48K		●		●	●		●	O1	Needs modem. A Viewdata frame word processor designed to aid data editing.
	£626.75	Apple II		Owlsync 3780	48K		●		●	●			O1	A full IBM 3780 emulator package allowing communication up to 2400 Baud.
	£454.25	Apple II		Owltel	48K		●		●	●		●	O1	Needs modem. Allows access to Prestel & private viewdata systems.
	£149.50	Apple II	●	Terminal Utilities	48K		●		●	●			C1	Also on Apple IIE. Converts Apple II to intelligent terminal. Speeds of up to 9600 BPS.
	£57.50	CP/M		Xcopy 1.0	64K		●		●	●			X1	Disk copy utility for Cromemco machines. Copies 8" or 5¼" single/double sided.
	£454.25	CP/M	●	Micro-Linkline	64K		●		●	●			I2	Also on UCSD-P. Teletype comms for transferring datafiles.
	£575	CP/M	●	Bisync AC-3780	64K		●		●	●			E1	Also on MP/M & CP/M86. Micro to mainframe comms through IBM terminal emulation.
	£41.40	IBM PC		Asynchronous Communications	64K		●			●		●	I3	Needs asynchronous comms adaptor. Makes PC act as asyncs comms terminal.
	£117.30	IBM PC		IBM 3101 Emulation Program	64K		●			●			I3	Makes PC act as 3101 terminal provides 3270 emulations when connected to host.
	£638.25	IBM PC		PC SNA 3270 Emulation	128K		●			●		●	I3	Needs SDLL adaptor card makes PC act as IBM 3270 terminal.
	£22.43	Sharp MZ80A	●	Zen	48K	●			●				K1	Also MZ80K & B. Full Z80 editor/assembler.
	£115.00	IBM PC	●	Interlink	48K		●			●			T2	Also on Sirius, Apple II, Xerox, Osborne etc. Connects processors for downloading.
Database	£132.25	Apple II		DB Master	48K		●		●	●			M5	Available on hard disk. Allows 1K records over 100 fields. Report generation, etc.
	£224.25	Apple II		Informex Database System	48K		●		●	●			I1	Database system which can be used to & update info on any type of record.
	£402.50	Apple II	●	Mailist	48K		●		●	●		●	A4	Also for IBM PC & Corvus Concept. Requires hard disk. A networking product.
	£96.60	Apple III	●	PFS: File	48K		●			●			P6	Also for Apple II (£135.70). Used in tandem with PFS (£96.60).
	£215.05	Apple II	●	VisiFile	48K		●			●			R1	Also on IBM PC (£273.70; 64K). A database program suitable for up to 500 entries.
	£217.35	Apple IIE		VisiTrend + VisiPlot	64K		●		●	●			R6	Also for CP/M. Graphic representation of data. Compatible with VisiCalc.
	£10.30	BBC Model B		Filer	16K	●			●				M7	Allows searching, sorting, saving & recovery of data.
	£201.25	CP/M	●	Dataflow II	56K		●		●	●			G1	Also on CP/M 86. Needs 160K disk space. Extract files to link with other systems.
	£201.25	CP/M		Datastaff	64K		●			●			X1	Data entry & retrieval system. Interfaces with WordStar
	£499.74	CP/M		dBase II	48K		●		●	●			E1	Micro DBMS. Can be used for high level programming for a range of applications.
	£557.50	CP/M		Superfile	56K		●		●	●			S4	Multi-file database giving application package information.
	£166.75	CP/M		Supersort I16	64K		●		●	●			M10	A sort utility for handling various forms of data files. Mainframe-like additions.
	£1,840	CP/M	●	MDBS II	64K		●						T2	Also on CP/M-86, MS-DOS, Turbo DOS, Unix and Xenix. Mainframe-like facilities.
	£569.25	Commodore 8000		The Administrator	96K		●		●	●			S11	Applications generator. No programming involved.
	£68.42	Newbrain		Invoice & Credit Program	32K	●			●				E2	The invoice program allows you to put in your own information and design invoice.
	£29.32	Newbrain		Database 40/S	32K	●			●				E2	Information gatherer, stores large quantity of information & can be interrogated at will.
	£684.25	Sirius	●	Tomorrow's Office	128K		●		●	●			S11	Also on IBM-PC & Victor. Complete applications generator.

Debugger	£258.75	CP/M	●	Animator	64K		●		●	●			M11	Also on Unix & MS100S, interactive source level debugging tool for CIS-Cobol.
File Transfer	£132.25	CP/M		BSTAM	16K		●		●	●		●	L1	Needs common interface ports or modem access. Utility for transfering CP/M files.
Graphics	£34.50	Apple II	●	Graphic Utilities	48K		●		●	●			C1	Also for Apple IIe. Parameter driven machine code programs' high res graphics.
	£24.95	Atari		Constructor	48K		●		●	●	●		C8	Less experienced & new programmers can design animated sequences.
	£9.95	BBC Model A	●	Creative Graphics	16K	●			●				W1	Also for BBC model B.30 programs on cassette produce range of pictures & patterns.
	£24.95	BBC Model B		EDG Graphics Package	32K	●			●				S7	Computer aided design package. Reviewed 11.3.83.
	£50.60	CP/M		CP/M Graphics	64K		●			●			D4	Range goes up to £421.70 & conforms to GKS Graphics Standard.
Language	£488.75	CP/M	●	CIS Cobol	64K		●		●	●			M11	Also on Unix. Compact, interactive ANSI 74 standard implementation of Cobol.
	£1,109.75	CP/M	●	Level II Cobol	96K		●		●	●			M11	Also on Unix & MS-DOS. High level ANSI 74. Compiler, mainframe-compat code.
	£396.00	CP/M		Fortran 80	48K		●			●			T2	Useful for scientific applications, where Pascal is inefficient.
	£285.20	CP/M	●	Pascal — MT+	64K		●			●			X1	ANSI standard Pascal for Z80 processors. Also on CP/M 86 (£484-90).
	£210	CP/M	●	Supersoft C Compiler	48K		●		●	●			M4	Also on CP/M-86, MS/DOS, PC. DOS. Fast implementation of C.
	£114.43	Commodore 64	●	DTL-Basic Compiler	32K		●		●				D1	Also on Commodore 8000, 4000 & 3000. Also tape version on CBM 64 (£39.90).
	£16.85	BBC Model A	●	Lisp on the BBC	16K	●			●				W1	Also on BBC Model B. Book available £7.50. Lisp is artifical intelligence language.
	£253.00	CP/M	●	ProPascal	56K		●		●	●			E1	Also on CDOS. Needs two disk drives. Native code Pascal.
	£40.19	Sharp MZ80A	●	Forth	48K	●			●				K1	Also on MZ80K & Osborne. Allows implementation of Forth.
	£25	Spectrum		Hisoft Pascal	48K	●							H5	Reviewed in *PCN* week ending April 8. Pascal compiler and screen editor.
	£421.70	Any 8 or 16 bit machine		PL/1	48K		●			●			D4	A compact implementation based on ANSI standard general purpose subset of PL/1.
	£350.75	IBM PC	●	Lattice-C	64K		●		●	●			L1	Also on MS/DOS. C' Compiler for 16 bit machines — full implementation & execution.
Linker	£224.25	CP/M		Plink 2	48K		●		●	●			L1	Up to 8 megabytes.
Operations	£59.80	CP/M		Operating Guide	48K		●		●	●			E1	Works by putting CP/M to sleep & replacing it with operating environment.
Operating system	£22.94	Apple II		Fasdos	48K	●			●				P4	Disk operating system for Apples which speeds up location of binary & Applesoft files.
	£277	8086 micro		Concurrent CP/M-86	48K		●			●			T2	Enables four separate tasks to run in a single user station.
	£295.20	Any 8-bit micro		CP/M+	128K		●			●			D4	Upward compatible from CP/M enhanced 8-bit micro. O/S.
	£126.50	Any 8-bit micro		CP/M 2.2	64K		●			●			D4	O/S for 8-bit micros with over 1.5 million users.
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Program Generator	£228.85	Apple II	●	Quickcode	64K		●		●	●			P4	Also on IBM PC. Program generator for dBase II.
	£126.50	CP/M	●	Forms-2	64K		●		●	●			M11	Also for Unix & MS-DOS. Programming tool, for generating Cobol code.
	£379.50	CP/M	●	Last One	64K		●		●	●			S3	Also on MS-DOS and Apple DOS.
Programming Tool	£2,500	Apple II	●	Pascal Isam/Pascal Form	48K		●		●	●			A4	Also on IBM PC & Corvus Concept. Needs Corvus hard disk. Pascal prog tool.
	£287.50	CP/M	●	Fileshare	48K		●		●	●			M11	Also on MP/M. Bank-switched memory or CP/M network.
	£7.95	Dragon 32		Dragon Selection 2	32K	●							D3	Four utility programs which can be listed to see how the program works.
Telex	£2,113.70	Superbrain	●	Micro Telex	64K		●		●	●			E1	Also on Televideo 802. Enables automatic sending-receiving or telex by micro.
Testing Tool	£95.82	CP/M 80	●	Diagnostics II	32K		●		●	●			M4	Also on CP/M-86 and MS/DOS. Tests systems.
Time Recording	£862.50	Commodore 8000	●	Minuteman	32K		●			●			C4	Also on Commodore 4000. Time recording system. Can produce range or reports.
	£402.50	CP/M-86	●	Time Recording System	64K		●		●	●			D2	Also on CP/M 80. Control over man/hour expenditure by job or account number.
Utilities	£23.00	Apple II	●	Computech Utilities Disk II	48K		●		●	●			C1	Also on Apple IIe. Error checking, copying. Single disk copy. Label disk.
	£115.00	IBM PC		C-Food Smorgasbord	64K		●		●	●			L1	Decimal arithmetic, low level & terminal independent input & output.

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F1 Ferrari, 01-751 5791 **F2** Farmplan Computer Systems, Ross-on-Wye 64321
G1 Great Northern, Leeds 589980 **G2** Graffcom Systems, 01-727 5561
H1 Hilderbey, 01-485 1059 **H2** Hartford Software Northwich, 781156 **H3** H & H Software, Runcorn 65566 **H4** Heinemann, 01-637 3311 **H5** Hisoft, Swindon 26616
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L1 Lifeboat, 01-836 9028
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X1 Xitan Systems, Southampton 334711

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Issue 1, March 11-18.
Pro-Tests: Apple's Lisa, Texet TX8000; Spectrum speech synthesiser, Apple printer, Commodore network; 3D on Spectrum, graphs package for Apple and IBM, BBC graphics system.
Features: computer chess, Occam parallel processing language, Victor/Sirius function keys.
ProgramCards: Towers of Bramah (Pascal), Biorhythm (Apple II), Roman Year (Apple II), Shape Utility (Apple II).
Gameplay: Darts, Soccer (Atari); Castle of Riddles (BBC Model B); Pimania (Spectrum); Flight Simulator (IBM PC).
Databasics: micros and peripherals.

Issue 2, March 18-25.
Pro-Tests: Toshiba T100, Casio PB100, ZX81/Basicare, Vic speech synthesiser, Spectrum spreadsheet, IBM graphics, BBC word processing.
Features: Colecovision, micro backgammon, nursery computing.
Gameplay: Ultima II (Apple), Trader (ZX81), Starquest (Vic 20), Hungry Horace (Spectrum).
ProgramCards: String editor (Spectrum), Analogue Clock (BBC Model B), Chart generator (Spectrum), String extract/replace.
Databasics: full software listings.

Issue 3, March 25-April 1.
Pro-Tests: TI Professional, Apple speech synthesiser, Facit 410 printer, IBM keyboards, Petspeed compiler, Sirius toolkit, Dragoncalc.
Features: Atom upgrade, Lynx programming, Apple music.
Gameplay: Mangrove (Vic 20), Mutant Herd (Vic 20), Compendium (Dragon), Patience (Spectrum), Noughts and Crosses (Dragon), Great Britain Ltd (Spectrum), Ulysses (IBM PC).
ProgramCards: Magnify (Spectrum), Spider (Vic 20), Firing Range (BBC).
Databasics: micros.
Micropaedia: Anatomy of the BBC, part 3.

Issue 4, April 1-8.
Pro-Tests: Pied Piper Communicator, Olympia ESW3000 printer, Namal Supertalker, Commodore Calcresult, Spectrum Pascal, Cashbook (BBC).
Gameplay: Dark Crystal (Apple II), St George (Dragon), Wizard War (Dragon).
ProgramCards: Fruit Machine (C64), Tunesmith (Oric), Array Editor.
Databasics: peripherals.
Clubnet: Clubs and user groups.
Micropaedia: Go Forth, part 1.

Issue 5, April 8-15.
Pro-Tests: Commodore 700, Ikon Hobbit, 1-2-3 (IBM), ZX81 machine code.
Features: speech packs, monitors.
Gameplay: Grand Prix (Dragon), Derby Day (Spectrum), Deadline (Apple).
ProgramCards: Wacky Racers (Oric), Fruit Machine (C64), Parse Integer.
Databasics: Software.
Clubnet: full list of user groups.
Micropaedia: Go Forth, part 2.

Issue 6, April 15-22.
Pro-Tests: Tycom Microframe, IBM PC, Scorpio Disks, Dragon sound module, ZX81 graphics, Bottom Line Strategist (CP/M), PaperClip word processor.
Features: IBM PC DOS, BBC word processing, PC-1251.
Gameplay: Mined Out (Spectrum), Transylvanian Tower (Spectrum), Lunar Leeper (Apple II), Evolution (Apple II).
ProgramCards: Wacky Racers (Oric), Mortgage Comparison (Sharp MZ80K), Computer Set Up (BBC), Day of Week.
Databasics: micros.
Micropaedia: Graphics, part 1.

Issue 7, April 22-29.
Pro-Tests: Mattel Aquarius, Epson FX80, Olivetti JP101, Lisp on Spectrum, Vic 20 assembler, Supergraf on Victor/Sirius.
Features: Dealer support, Atari graphics.
Gameplay: Krakit (ZX81), Cruising On Broadway (Spectrum), Kaktus (Vic 20), Fantastic Voyage (ZX81).
ProgramCards: CBM controls, Computer Set Up (BBC), Wacky Racers (Oric), Julian Dates.
Databasics: Peripherals.
Micropaedia: Graphics part 2.

Issue 8, April 29-May 6.
Pro-Tests: Atari Home Files Manager, Kobra's Vic Stat for the Vic 20, Hestacrest's Accounts for the Spectrum; Epson RX80 printer. NCR's Decision Mate V. Future Computer's FX20.
Features: Micronet, Compact programming on the TI99/4A.
Gameplay: Harvester (Vic 20), Strategic Command (Dragon 32), A first Book of Micro Rhymes (BBC), Telling the Time/Money (Spectrum).
ProgramCards: Program Indexer (BBC B), CBM Database cards 1-4, Sort/Extract.
Databasics: software.

Issue 9, May 6-13.
Pro-Tests: Structured Basic on the Apple, Pixel Power on the Vic 20; Star DP510 printer, Dams and Interpod interfaces for Commodore 64; Micro-Professor.
Features: BBC function keys, Atari word-processing part 1.
Gameplay: Dungeons of Intrigue (Oric), The Castle (Oric), Starship Command (BBC B), Dragon Trek, Nowotnik Puzzle (Spectrum).
ProgramCards: Lower case (Dragon 32), CBM database cards 5-6, Monster (Spectrum), Wildcard Search (MBasic).
Databasics: hardware.
Micropaedia: Graphics, part 4.

Issue 10, May 13-20.
Pro-Tests: Infomast on Commodore 64, Dragon Mace; MC202 and CMU800 music synthesisers (Apple), Prism directly coupled modem; Epson QX10.
Features: ZX81 graphics part 1; Atari word-processing part 2.
Gameplay: Rescue (Spectrum), Dictator (Spectrum), Roman Empire (Spectrum), Choplifter (Vic 20), Skyhawk (Vic 20).
ProgramCards: Union Jack (Lynx), Escape (Spectrum), CBM Database cards 7-9, Evaluate (MBasic), Formula (BBC B).
Databasics: peripherals.
Micropaedia: Graphics, part 5.

Issue 11, May 20-26.
Pro-Tests: BBC Vufile, PFS:File for IBM, Apple Pascal; printer comparison, Pickard Joystick Controller for ZX81 and Spectrum; C9E Computer Board.
Features: ZX81 graphics part 2, Basic on the Sharp MZ80K.
Gameplay: Motor Mania (Commodore 64), Oric Flight, BBC Music Synthesiser, Music Maker (Spectrum), Embassy Assault (Spectrum), Tobor (Spectrum).
ProgramCards: Homeward Bound (ZX81), Connect Four (Dragon 32), CBM Database, cards 10 — end.
Micropaedia: Keyboards.

Issue 12, May 27-June 2.
Pro-Tests: Spectrum word processor, PFS:Report on IBM, File Handling for Colour Genie; CTI CP80 type 1 printer, TG Trackball; Sord M5.
Features: Epson Basic, Oric sound part 1, Tandy Colour graphics.
Gameplay: Mad Martha (Spectrum), Frenzy (Spectrum), Headbanger (Spectrum), Oric roundup.
ProgramCards: Election Barchart (Commodore 64), Memory Utility (BBC B), Munch (Spectrum).
Databasics: Hardware.
Clubnet: clubs (Cambridge Microcomputer Club special).
Micropaedia: Disk Drives, part 1.







Issue 13, June 3-9.
Pro-Tests: Telewriter for Dragon 32, Abersoft Forth for Spectrum, GPS graphics processing system for Apple II+; joysticks, rulers; Ajile.
Features: Dragon meets Tandy, Oric music part 2, transferring Basic for Colour Genie and Genie 1.
Gameplay: Everest Ascent (Spectrum), Colour Genie roundup, Micro Maze (Jupiter Ace), Qix (Atari).
ProgramCards: Cupid (Oric), Alien (Dragon 32), Time Bomb (Atari).
Databasics: peripherals.

Issue 14, June 10-June 15.
Pro-Tests: Apple Accelerator II board, Modula-2 (Apple II), Oric-Base, Joystick Control Unit J6, Kempston Centronics Interface, BBC Speech Synthesiser.
Features: Newbrain Basic part 1, Sirius designing.
Gameplay: Ah Diddums (Spectrum), Monopole (Commodore 64), Automonopoli (Spectrum), Dragon dramatics.
ProgramCards: Time Bomb (Atari, cont), Sheep Drive (BBC B).
Databasics: Software.
Micropaedia: Spectrum, Part 1

Issue 15, June 16-June 22.
Pro-Test: Comx 35, Address Manager (Spectrum), Sysres (Commodore 64), MST Database (Epson HX-20), Voice Input Module (Apple II).
Features: Newbrain Basic part 2, Genie scene.
Gameplay: Cleared for Landing, Playing the Ace (Apple II), Vultures, Star Jammer (Dragon 32).
ProgramCards: Mover (BBC B), Sprite Clock (Commodore 64), Pirate Island (Atari, 3 of 9), Micro-mind (Colour Genie), Brickbat (Dragon 32).
Databasics: Hardware.
Micropaedia: Spectrum, part 2.

Issue 16, June 23-June 29.
Pro-Tests: Atari v Acorn, word processing for the Commodore 64, Simplifile (CP/M), MPF-II printer, Z80 Pack for BBC.
Features: ZX81 Maths, US mail order, Atari graphics.
Gameplay: Computer Scrabble (Spectrum), Education (BBC), Horace and Spiders (Spectrum), Catcha Snatcha (Vic 20).
ProgramCards: Video Titler (TI99/4A 3 of 6), Bowling (Spectrum), Pirate Island (Atari cont).
Databasics: Peripherals.
Micropaedia: Spectrum, part 3.

Issue 17, June 30-July 6.
Pro-Tests: Duet-16, The Organizer (CP/M), Trace and ZX Text (Spectrum), Juki 6100 daisywheel, Videx Ultra Term (Apple II).
Features: Leasing part 1, Atari screen action.
Gameplay: Oric chess, Grand Master (Commodore 64), Escape from Orion (BBC), Jet Pac (Spectrum), The Ring of Darkness (Dragon 32), Spectrum spectacle.
ProgramCards: Video Titler (TI99/4A cont), Pirate Island (Atari cont) Word processor (BBC).
Micropaedia: Sound, part 1.
Databasics: Software.

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Atari games for sale. Zaxxon, £20. Darts, £12. Snooker + Billiards, £12. Up Up + Away, £10. Boxing, £7. Or whole lot, £55. Iver 654785.

Spectrum Flight Simulator, Chess, £5 ea. Timegate Football Manager, £4 ea. Jetpac Arcadia, £3 ea. Mined-out, Meteor Storm, £2.50 ea, or swops. High Wycombe 443184.

Acorn Atom 12K+12K +4K Floating Point ROM, power unit, lots of software, games, books, etc. All under one year old. Mint condition, £200 ono. Write: C. Lanham, 30 Lingdale Road, Southbourne, Bournemouth, Dorset.

Video Genie 48K, built-in cassette, sound, joystick, printer interface, lots of software and books, £250 ono. 09367 5773.

Tuscan Z80A 40K static RAM, large keyboard, metal case, parallel printer port, 3P/2S ports, Basic, m/c monitor, £450 ono. Fyfe, Woking 69522 evenings.

UK101 8K, Cegmon, cased, 300/600 baud, sound, many games and information, £90 ono. D. Callender, 17 Badger Way, Banbury, Oxon. Banbury 53475.

Printer, Tandy Lineprinter VII, six months old, perfect condition, (similar to Seikosha GP100 but with RS232 and Centronics interface), £145. Hemel Hempstead, (0442) 67918.

Acorn Atom fully expanded 12K, BBC basic, floating point ROM, power supply, instruction manual, leads. £60 software, including introductory package, £150. Deal 62857.

Birnbaum's Assembly Language Programming for the BBC Microcomptuer, new and unused, £7.50 post paid. 92 Waterfall Road, London N14 7JT. 368 2756.

Atari software Miner 2049er, £15, Preppie, Sea Dragon, Jaw Breaker, £12 each. Ghost Encounters, Protector, Airstrike, Rescue at Rigel, Invasion Orion, £8 each (originals). (0253) 403994.

Tandy CGP-115, four-colour printer/plotter complete with manual, RS232 and Centronics interfaces. As new, under guarantee. Cost £150, sell for £110. 01-727 5780 (evenings).

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TI 99/4A Parsec or Adventure + Pirate cartridges wanted in exchange for either Munchman or TI Invaders cartridges. 041-336 7084.

Spectrum 16K, cassette player, Kempston joystick, two games cassettes, book of 21 games, five rolls of printer paper, under guarantee, £125 ono. Peterlee 869453.

Apple II 48K, 12in BMC green screen, 16K card, 80-col card, super serial card, two disk drives, controller card, £900 ono. D Hansford. 0225 313012.

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Atari 400, recorder, Donkey Kong, Pac-man, Galaxion, Pool, Super Cube, Euro-Scene Jigsaws, and Airstrike, worth £450, want £300. 01-778 1016, ask for Gary.

Acorn Atom 12K+12K, 5 Amp PSU, lots of documentation games: Chess, Galaxian, Pinball, Asteroids, Invaders, 3D Maze, £140 ono. Oxford 739545.

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ZX81 for sale, mint condition with leads, manual. Only 1K, but bargain at a mere £35. Bedford (0234) 216215 now!!!

BBC software, Acornsoft's Invaders + Breakout + Dodgems + Snake and Bug Bytes Galaxy Wars. Worth £20, sell for £12. David Lukes. 01-977 5134 after 4pm or at weekends.

Genie ITRS-80 16K Level 2 ten program tape, £6.95. Squash, Breakout, Racing Driver, Maths, Graphics + many more. Sound. M. Marsden, 2 Vincent Close, St Catherines Gardens, Leicester LE3 6ED.

BBC Model A updated as follows: OS1.2 via chips, RGB, RS423, user, analogue and printer ports. Plus software, £320. 0963 250115 (north Dorset).

Sharp MZ-80K 48K with Quantum hi-res graphics and reset button. Extensive software including many games, languages etc. Value £600+ As new, £350. Wilmslow 526663.

Commodore 4040 dual disk drive, only six months old, dust cover always used. Selling to update to 8050, £600. Wokingham (0734) 789775 evenings.

Nascom 2 8K ROM Basic 24K RAM Eprom board, NAS-SYS1 monitor, manual, books, cassette, offers around £150. 01-993 1852 day, 274 3070. You collect.

Wanted. Epson HX20 and cassette. Bob, 01-387 5838 before 5.30pm.

Tec FP1500-25 Daisywheel Printer, only two months old, vgc, new. £595, yours for £500. 10 months warranty. M. Williams, Sunbury-on-Thames. 61144 or Windsor 55321.

VIC 20 Computer C2N cassette unit, 16K cartridge, joystick, mags and books include Vic revealed, lots of games and software. Will sell for £130. (Bristol) 644934 after 6pm or weekend.

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Colour Genie software, Kansas's Chomper and Cosmic Attack, Mysterious Adventure No. 2, Time Machine. Cost £30, asking £16, will split. Minety 207 evenings, weekends.

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Wanted, £110 paid for disk drive or full sized printer (not GP-80A) for use with BBC microcomputer. Tel: Upminster 24385.

ITT 2020 64K Two disk drives 3.3 DOS TV modulator. Parallel printer card, 9 Hitachi monitor games paddles. £800 ono. Squires, 12 Sloane St, London SW1. Tel: 01-734 7316.

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ZX81, 16K with manual, all leads, p.s.u. m/c book, software. All boxed and in excellent condition. Just £40 for quick sale. Tel: 01-351 0784.

Acorn Atom 12K RAM +12K ROM, manuals, p.s.u., software 747, Cylon Attack, etc. £140 ono. Tel: 01-561 8747 evenings.

Atari 400/800 games, cartridges, Star Raiders £18, QIX £18, Pac-man £18, Miner 2049er, £22. T6K cassettes: Frogger £12, Airstrike £12. Full documentation. Tel: Southport (0704) 28233 evenings.

TRS 80 16K level II, TV modulator, 12" B&W TV monitor, some games, books. £150 ono. PR-40P Dot matrix printer, connects direct to Pet. £85 ono. 41 Bournemouth Park Rd, Southend-on-Sea. Tel: Southend 0702 64756.

Sharp MZ80K software for sale, utility programs, adventure games, Sharp MZ80K. £199. S. Payton, The Prince of Wales Inn, Ligfield Road, East Grinstead, Sussex. 0342 25703.

Atari VCS with Dodge'em, Indy, Asteriods, Invaders, Missile Command, Space Wars, spare controllers. £120 or will split. A. Slans, 8 Basmere Close, Vinters Park, Maidstone. Tel: 675477.

Vic 20 Starter Pack + Frantik + Skramble + Games tape. All less than one month old, really must sell! Worth £160+, take £130. Gravesend (0474) 67326.

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Commodore 64, plus C2N recorder and Introduction to Basic Part 1. £300 ono (New Feb.) 0268 285406 evenings (Basildon).

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Nascom NAS-SYS 1-3 40K, Basic, Pascal, Forth, Assembler. Some games cased. Offers to David Lees, 18 Lawhead Road West, St. Andrews, Fife, Scotland.

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Hardware

Richard King puts together the micro he'd like to see.

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Packages that have designs on your BBC Micro in the twinkling of a pixel.

Micropaedia

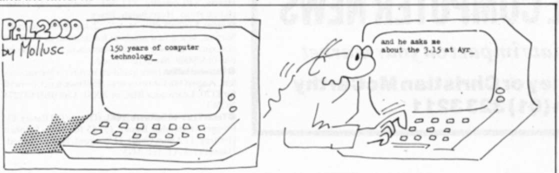
Part 5 of our study of the sound properties of micros.

Plus all the regular features and the latest news.



What is Tony Clarke (left), managing director of Dragon Data, doing with a horse and a rider at Dragon's Port Talbot factory? Will Dragon be putting a horse into the promotions field against Epson with Miss World? Has Port Talbot become an unsaddling enclosure?

Put words into the mouths of Mr Clarke, the horse, or Rosalind Bevan to enter our latest Laughline contest. Send them to PCN at Evelyn House, 62 Oxford St, London W1A 2HG, by August 4, and we'll announce the winner shortly afterwards.



What results?

We knew we'd use it some time. As the temperature soars and the computer industry steadfastly refuses to do anything silly, it's obviously time to dust off an old chestnut we've been saving up for you.

A US company called Computerock advertised its latest product in the Wall St Journal. It's the Personal Computer Rock — miniaturisation carried to its logical conclusion. Millions of transistors have shrunk so small they no longer exist. So easy to use you don't even have to turn it on. Modularly upgradable with Peripheral Pebbles™ so it can extend its non-functionality as your needs grow. Best of all you get your $13.95 back if it actually works.

It's hard to tell how seriously advertisers and customers viewed the promotion but we have a sneaking suspicion Computerock may have had a lot of takers.

Our suspicions were confirmed when CE Software came out with Invisicalc — a programme which does nothing.

PCN DATELINES

PCN Datelines keeps you in touch with up-coming events. Make sure you enter them in your diary.

Organisers who would like details of coming events included in PCN Datelines should send the information at least one month before the event. Write to PCN Datelines, Personal Computer News, 62 Oxford Street, London W1A 2HG.

UK EVENTS

Event	Dates	Venue	Organisers
8th ZX Microfair	August 20	Alexandra Palace, London	Mike Johnstone, 01-801 9172
Acorn User Exhibition	August 25-18	Cunard International Hotel, London	Computer Marketplace Ltd, 01-930 1612
Computer Open Day	September 1	Draganora Hotel, Leeds	Tony Kaminiski, Couchmead Communications Ltd, 01-778 1102
Video, Audio and Computer Show	Sep 16-18	Bradford Exposition Centre	R. Cooper, J. Wood & Sons Ltd, Bradford 720014
Home Entertainment Show	Sep 17-25	Olympia, London	Montbuild Ltd, 01-486 1951
Computer Open Day Exhibition	September 22	Central Hotel, Glasgow	Couchmead Communications Ltd, 01-778 1102
Microcomputers in Business	Sep 27-29	Warwick University, Coventry	Peter Bubb, 01-892 4422
Personal Computer World Show	Sep 29-Oct 2	Barbican Centre, London	Montbuild Ltd, 01-486 1951
Computer Fair	Oct 2	The Sir Frederic Osborn School, Welwyn Garden City	R Brown Welwyn Garden City 23367
European Computer Trade Forum	Oct 4-7	NEC, Birmingham	Clapp & Poliak Europe Ltd, 01-747 3131

OVERSEAS

Event	Dates	Venue	Organisers
International Micro Computer Exhibition	Aug 2-5	Kuala Lumpur, Malaysia	Conference & Exhibition Management Services SDN BHD, 9-A Jalan SS24/8 Taman Megah, Petaling Jaya, Selangor
National Computer Business & Office Systems	Aug 16-19	Auckland, New Zealand	Trade & Industrial Exhibitions, 12 Heather Street, Parnell, PO Box 9682, Auckland
Personal Computers & Office Automation Systems Exhibition	Sep 5-8	Amsterdam, The Netherlands	RAI Gebouw BV, Europaplein 2, 1078 GZ, Amsterdam
Australian Computer Exhibition	Sep 13-16	Melbourne, Australia	Riddell Exhibition Promotions PTY Ltd, 166 Albert Road, South Melbourne, Vic 3205
International Peripheral Equipment & Software Exposition	Sep 13-15	Moscone Centre, Anaheim, USA	Cahners Exposition Group SA, 0483 38085

Announcing more exciting programs for the BBC.

Acornsoft is the software division of Acorn Computers, the company that designed and built the BBC Microcomputer. Here are four more exciting programs, all designed to get the most from your BBC Micro.

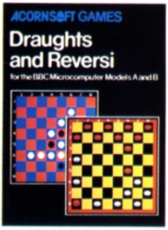
Magic Garden (£9.95) is a cassette based on Shirley Conran's successful book. It's a problem-solving program which provides the complete beginner with instant answers to the questions of what to plant and where. Simply tell the computer whether you prefer a shrub or a flower, the type of soil, light and shade conditions and required flowering time and the computer will come up with a selection of possible plants.

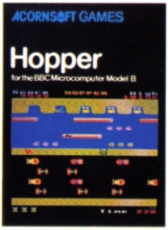
Draughts & Reversi (£9.95) is a cassette containing two traditional board games for you to play against the computer. Both give a graphic display of the board on the screen and you can enter your moves with either keyboard or joystick. The games can be played at varying levels of difficulty and on the higher levels you will find the computer to be a very worthy adversary.

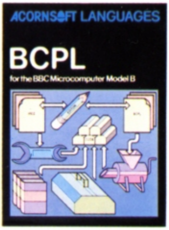
Hopper (£9.95) is a game on cassette which can be played with either keyboard or joysticks. Hop the frog across the busy motorway trying to avoid four lanes of fast-moving traffic. To get across the river to the frog's lair you must leap on to the logs and turtles' backs, but beware of the diving turtles, the crocodile and the snake.

BCPL (£99.65) is a flexible modern structured language that's very easy to learn. The package consists of a BCPL language ROM, a 40/80 disc and a 450 page User Guide. The disc contains the BCPL Compiler, a Screen Editor and a 6502 Assembler. BCPL is particularly good at handling Input and Output and is ideal for writing utility programs and to develop games and commercial packages.









How to get Acornsoft programs.

If you're a credit card holder and would like to buy the programs shown in this advertisement, or if you would like to know the address of your nearest stockist, just phone 01-200 0200.

Alternatively, you can buy the programs directly by sending off the order form below to:
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